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CORRECTION

January 1942, vol. 70, page 5, in the footnote at bottom of column 1, the volume number should be "59," and the year "1931."

MONTHLY WEATHER REVIEW

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A METHOD OF MEASURING RAINFALL ON WINDY SLOPES

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THE object of precipitation measurement, as stated by Brooks (**1**), is to obtain "a fair sample of the fall reaching the earth's surface over the area represented by the measurement." The area referred to is horizontal, or map area. Even when measured on a slope, precipitation is always expressed as depth of water on a horizontal area.

On wind-swept areas, whether flat or sloping, many factors hinder the accurate measurement of precipitation. Koschmieder (**5**), Brooks (**2**), Riesbol (**6**), and many others have adequately demonstrated that a rain gage of conventional design, conventionally installed with the receiver two or more feet above the ground surface, will not catch from wind-borne rain a representative sample of the catch at the earth's surface. This failure is attributed to the turbulence produced in the wind stream by the gage—an "upward diversion and marked acceleration of air over the gage" (**1**), and eddy currents within the mouth of the receiver, which whip away many raindrops that would otherwise enter the gage. The catch by a gage mouth elevated above the earth's surface is therefore less than the amount actually reaching the earth.

This error is accentuated when measurements are attempted on mountain slopes. There, in addition to the turbulence caused by the gage in the air stream, the horizontal receiver is exposed to the rain-bearing winds at a different angle than is the ground surface and therefore intercepts the falling rain differently. The significance of this factor was recognized by the Hydrologic Division of the Soil Conservation Service in a recent publication (**7**) in which it was stated, "The exposure of the individual gages (on the North Appalachian Experimental Watershed) ranged from poor to excellent, due to the steep and highly dissected topography of the area and to the presence of much woodland and numerous farmsteads."

All of these measuring difficulties were encountered during the summers of 1935–1936 when, as part of a study of the topographic distribution of forest-fire danger,[2] rainfall was measured with conventionally exposed gages at six mountainside and one valley-bottom stations on the Priest River Experimental Forest in northern Idaho.

The precipitations recorded differed so markedly and illogically between stations having different aspect, elevation, and exposure to wind that some had to be judged erroneous. As previous investigations, already cited, had shown wind to be a common cause of gaging inaccuracies, some special installations to eliminate wind effects were designed in 1937. These were then operated alongside the conventional installations. Three season's data revealed a much more logical and what is believed to be a more true relationship between the stations in the amounts of rain recorded.

DESCRIPTION OF GAGES AND THEIR INSTALLATION

Each special installation consisted of a "sloped-orifice" gage in pit exposure. Exposing gages in pits with their receivers even with the ground surface had been shown (**2, 5, 6**) to be an effective means of shielding them from the accuracy-destroying winds. To place them in a pit on a slope, however, and still keep the orifice even with the surrounding surface required either that the gage be tilted from its usual vertical position, or that the orifice be sloped. If the gage were tilted, its catch would have to be multiplied by the secant of the angle which the orifice made with the horizontal (**1**) to convert it to a true measure of the fall on unit horizontal area.

As it was obviously desirable to avoid this mathematical correction, and as W. A. Rockie[3] had reported that rainfall, as collected by large concrete run-off tanks located on sloping ground near Pullman, Washington, had been reliably sampled by sloped-orifice gages in above-ground exposure, sloped-orifice gages were adopted. The sloping orifice permitted each gage to be placed with the plane of the orifice parallel to and contiguous with the surrounding ground surface, and yet be kept in a vertical position so that its catch was a direct measure of the fall on unit horizontal area.

The sloped-orifice gage, shown in figure 1, consists of a Forest Service type gage with a sloped, galvanized, sheet-iron extension added to the receiver. Each receiver was sloped individually to fit the incline of the station where it was to be used. The extensions were added in a local (Missoula, Mont.) metal-working shop at a cost of $1.89 each which, when added to the $1.31 unit cost of the

[1] When this report was prepared the author was Assistant Forester at the Northern Rocky Mountain Forest and Range Experiment Station, Missoula, Mont.

[2] A complete description of the study area and rain-gage locations is presented in the United States Department of Agriculture Circular No. 591, "Influence of altitude and aspect on daily variations in factors of forest-fire danger" by G. Lloyd Hayes. This gives in detail the results of the major study of which the rain measurements treated in this paper were part.

[3] In an unpublished paper presented before the Northwest Scientific Association at Spokane, Wash., in December, 1936.

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FIGURE 1.—The 2,700-foot, north-slope installation, showing on the left the Forest Service rain-gage exposed in the "conventional" manner, and center, the various parts of the slope-orifice gage. The sloping orifice of the gage fits flush with the surface when the gage is placed in the hole in the center of the splash-preventing mat. (Photo F350663 by K. D. Swan, U. S. Forest Service.)

Forest Service gages, made a total cost of only $3.20 for each specialized instrument.

To shield the pit-exposed gages from surface splash, they were surrounded by 6 by 6 foot square, splash-preventing mats of ordinary excelsior covered by half-inch mesh hardware cloth as shown in figure 1. This mat design stopped rain splash efficiently but was ineffective for large hail. All storms that included hail were, therefore, excluded from the analyses. Riesbol (**6**) found that under some conditions a spray from breaking raindrops might be swept by the wind along the ground surface and erroneously increase the catch of a pit gage, but it is believed that the herbaceous and brushy ground cover around these stations (fig. 1) was a protection against such an occurrence during this study.

The "conventional" installation at each station consisted of a Forest Service type rain gage exposed about two feet above ground as shown at the left in figure 1. This gage is similar in pattern to the Weather Bureau standard type but differs from it in capacity and materials. Hayes (**3**), using 330 comparative measurements of rainfall with the Forest Service and Weather Bureau standard type gages, and 311 comparative measurements with a Friez tipping-bucket type, has demonstrated the comparability of the Forest Service type to these common standard designs. As the sloped-orifice gages were but modified Forest Service gages, the two installations at each station differed only in the shape of the gage orifice, length of rim above the funnel, and in the relation of the gage orifice to the ground.

RAIN-GAGING STATIONS

Rain was measured at seven different stations; one on the valley bottom and the other six on the mountain slopes above. It was at the latter six stations that the sloped-orifice gages were used. The valley-bottom station was on a flat where, although it was quite open to wind movement, the storm winds which frequently accompanied rain were not so strong as at some of the stations above. Only a conventionally exposed rain gage was used at the valley station until 1939, when a pit-exposed gage was added. No significant difference was found between a season's catch of the two gages, indicating that accurate measurements could be obtained there by either method of exposure.

The six slope stations were paired at elevations of 2,700, 3,800, and 5,500 feet respectively; one of each pair on a true north and one on a true south slope. The two stations which comprised each pair were in no case more than 300 feet apart, nor more than 50 vertical feet below the crest of the ridge that separated them. They differed only in that one faced north, the other south, and in the steepness of the slope.

The south-slope stations were subject to greater wind effects than the north, as the storm winds were predominantly from a southerly direction. The average velocities for August 1935–38, measured 7½ feet above the ground, for example, were 3.9, 3.6, and 4.5 m. p. h. respectively at 2,700, 3,800, and 5,500 feet on the south slope, but only 2.4, 2.0, and 3.4 m. p. h. at corresponding elevations on the north slope. When the wind was stronger than average, as it frequently was during rainstorms, the contrast between aspects was much greater. During one such storm on October 4, 1939, it averaged over a four-hour period 11.1, 12.7, and 11.8 m. p. h. respectively at 2,700, 3,800, and 5,500 feet on the south slope, but only 3.1, 2.2, and 5.1 m. p. h. on the north.

The 3,800- and 5,500-foot south slope gages were subject to the greatest wind effects. In addition to being on the windward side of the mountain, there was very little shrubbery or other vegetation near the gages that was high enough to shelter them from the full effects of the wind. The gages at the third south-slope station, at 2,700 feet, were also on the windward side of the mountain of course, put they were partly sheltered from the wind. The station there was in a 32- by 32-foot clearing in a brush patch that undoubtedly reduced the wind at rain-gage height, although it had little apparent effect at anemometer height.

The north-side stations differed considerably in degree of openness to wind. At 5,500 feet the gages were fully as exposed as at the 3,800 and 5,500-foot stations on the south side, but at 2,700 feet the north station, like the south, was in a clearing in a brush patch (fig. 1) where the gages were undoubtedly partly sheltered. The 3,800-foot north station was the most sheltered of all. This station was in a clearing in dense green timber where, even though the gages were from 100 to 250 feet from the edges of the clearing, strong winds never penetrated. Even at the anemometer height of 7½ feet, a velocity of as much as 6 m.p.h. for as much as one hour was never recorded in five seasons of measurements.

In relation to steepness of slope, another factor that affects rain-gaging accuracy, the 3,800-foot stations were least favorable for accurate gaging. There the ground sloped 28° on the south, and 27° on the north side. The 2,700-foot south station was most favorable with a slope of only 15°, and the other three stations were approximately average; 21° at 2,700 north, and 20° at each of the 5,500 foot stations.

RESULTS

The results of the measurements in 1935–36 by conventional methods, shown in table 1, illustrate well the deficiencies of the conventional-type gages when used in conventional exposure on windy slopes. The catch of the partially sheltered 2,700-foot gages was nearly the same on both aspects, the south side catch being only three percent greater than the north, indicating that approximately equal amounts of rain probably fell on each side of the ridge. At 3,800 and 5,500 feet, however, the catches of the exposed gages on the windy south slope were far less than the catches on the less windy north slope, being only 83 and 91 percent respectively. If as much rain fell on the windward south slope as on the leeward north slope at these elevations, the gages did not catch as much of it.

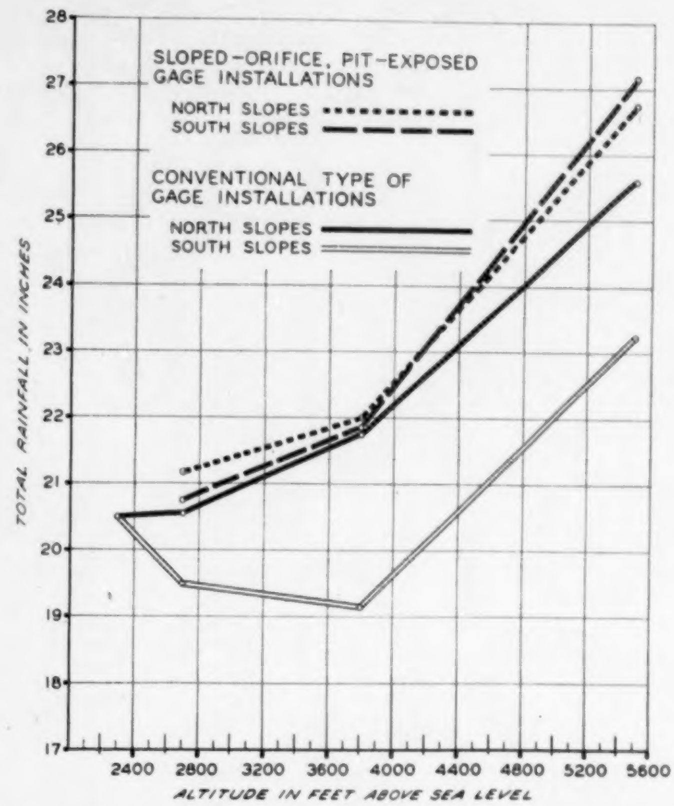

FIGURE 2.—Total rainfall for the 1937–39 seasons as measured by both the slope-orifice, pit-exposed gages, and the conventional type gages and exposure. Priest River Experimental Forest. Length of season: 1937, June 1–October 6; 1938, June 10–October 10; 1939, May 29–October 9.

Further evidence that the gages on the windward side were deficient in catch was furnished by the rainfall-altitude relationships on the two sides of the ridge. On the leeward north side the rainfall catch increased progressively with elevation in accordance with frequently demonstrated rainfall-altitude relationships (**4**), but on the windward south aspect the catch, even as high as 3,800 feet, was actually less than on the valley bottom 1,500 feet below.

In 1937–39 the results from the conventional installations continued to show these same serious discrepancies, but the pit-exposed, sloped-orifice gages revealed an entirely different relationship between stations. For contrast the results from both types of installations have been shown in figure 2. Instead of the large differences that were shown by the regular installations between aspects, the north and south sides were now shown by the special gages to receive about equal amounts of rain. In fact, it is shown by table 2 that the rainfall on the two aspects, as caught by the sloped-orifice gages, did not differ by a statistically significant amount except at the 2,700-foot stations.

Furthermore, instead of decreasing with elevation up to 3,800 feet, the rainfall on south slopes was shown to increase in the usual manner. These results are believed for two reasons to represent a high degree of gaging accuracy. First, the design and exposure of the gages were based upon the sound and demonstrated principles that

on windy slopes, rain gages should be installed with their receivers parallel to the slopes (**1**), and that pit exposure, if properly protected from splash, effectively eliminates the wind disturbance created by a standard gage conventionally exposed (**5, 2, 6**).

Second, the differences between the catches of the sloped-orifice and conventionally exposed gages were greatest where the gages were most exposed to strong winds and were the least where the gages were most sheltered. This is clearly evident in table 3 which shows that at the exposed and windswept 3,800- and 5,500-foot south stations the sloped-orifice gages caught 2.68 and 3.87 inches, respectively, more during the three seasons than did the conventional type, whereas at the very well sheltered 3,800-foot north station the totals differed by but 0.21 inch. There where the wind velocity 7½ feet above ground averaged but 2 m. p. h. and never exceeded 6 m. p. h. for as much as 1 hour even during the most violent storms, any soundly designed gage should sample rainfall accurately and there, according to table 3, the two types of installations gave measurements that agreed so closely that no statistical significance can be attached to the small difference. At all the other stations the excess of the catch of the sloped-orifice over the conventional gage installation was statistically significant at the 0.01 level of probability.[4]

SUMMARY AND CONCLUSIONS

The accurate measurement of rainfall is very difficult on wind-swept mountain slopes. Conventional methods are inadequate for such situations. A high degree of accuracy has been obtained, however, with sloped-orifice gages in pit exposure.

Numerous measurements of rainfall, now made by conventional methods on open, windy slopes, could be made much more accurately by the methods herein described. On the National Forests of Montana and northern Idaho, for example, over 700 conventionally-exposed rain gages are used as aids to forest fire control management. Many of these are located on mountain summits where the winds that accompany summer convectional rainstorms frequently reach velocities of 35 to 50 miles per hour.

TABLE 1.—*Precipitation during 1935 and 1936 seasons*[1] *as measured by conventionally exposed rain gages at 1 valley-bottom and 6 mountainside stations*

Situation and elevation (feet)		1935	1936	Mean
		Inches	*Inches*	*Inches*
Valley bottom	2,300	3.01	6.55	4.78
North aspect	2,700	3.57	6.14	4.86
	3,800	3.98	6.31	5.14
	5,500	4.64	6.93	5.78
South aspect	2,700	3.41	6.61	5.01
	3,800	2.92	5.66	4.29
	5,500	3.88	6.59	5.24

[1] Priest River Experimental Forest. Length of season: 1935, May 22–Oct. 7; 1936, May 20–Oct. 2.

[4] Meaning that there is a probability of only one or less in 100 that the difference found was due to chance or that data for three other seasons might show opposite results.

Under such conditions Koschmieder (**5**) found that conventionally exposed gages may catch less than 30 percent of the actual rainfall as measured by pit gages. For selected storms during the present study the conventionally installed gage at the windy 5,500-foot, south-slope station caught as little as 50 percent of the catch of the sloped-orifice, pit-exposed gage. Measurements under such conditions by conventional installations cannot be sound aids to fire-control management.

TABLE 2.—*Comparison of north- and south-aspect rainfall as measured by sloped-orifice gages in pit exposures at 3 elevations*[1]

Elevation (feet)	Number of storms	Total rainfall		
		North slope	South slope	Difference
		Inches	*Inches*	*Inch*
2,700	48	21.20	20.73	[2] 0.47
3,800	49	21.98	21.88	.10
5,500	50	26.73	27.16	.43

[1] Priest River Experimental Forest for the 1937–39 seasons.
[2] Statistically significant at the 0.05 level of probability.

TABLE 3.—*Comparison of rainfall as measured by sloped-orifice rain-gages in pit exposures, and by conventional-type rain-gages in conventional exposures at 6 mountainside stations*[1]

Situation and elevation (feet)	Number of storms	Total rainfall		
		Forest Service gage	Sloped gage	Difference
North aspect:		*Inches*	*Inches*	*Inches*
2,700	49	20.61	21.22	[2] 0.61
3,800	49	21.77	21.98	.2
5,500	52	25.61	26.76	[2] 1.15
South aspect:				
2,700	48	19.54	20.73	[2] 1.19
3,800	49	19.20	21.88	[2] 2.68
5,500	50	23.29	27.16	[2] 3.87

[1] Priest River Experimental Forest, for June 7 to Oct. 6, 1937; June 10 to Oct. 10, 1938; May 29 to Oct. 10, 1939
[2] Statistically significant at the 0.01 level of probability.

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(**7**) **U. S. Soil Conservation Servive.** 1941. Hydrologic data, North Appalachian Experimental Watershed, Coshocton, Ohio, 1939. Hydrologic Bull. 1, 193 pp., illus.

METEOROLOGICAL AND CLIMATOLOGICAL DATA FOR MAY 1944

[Climate and Crop Weather Division, J. B. KINCER, in charge]

AEROLOGICAL OBSERVATIONS

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by radiosondes during May 1944*

STATIONS AND ELEVATIONS IN METERS ABOVE SEA LEVEL

Altitude (meters) m. s. l.	Albany, N. Y. (86 m.)				Albuquerque, N. Mex. (1,620 m.)				Apalachicola, Fla. (5 m.)				Atlanta, Ga. (300 m.)				Big Spring, Tex. (774 m.)				Bismarck, N. Dak. (505 m.)				Boise, Idaho (868 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	1,007	15.5	71	31	836	18.7	28	31	1,018	21.8	84	31	984	20.9	70	31	925	21.9	48	30	953	15.1	66	31	913	16.1	45
500	31	960	15.8	62					31	962	20.4	62	31	962	21.0	59												
1,000	31	905	13.5	61					31	908	17.8	56	31	908	17.9	60	31	901	21.6	44	30	899	14.1	57	31	899	16.5	37
1,500	31	853	10.9	61					31	856	14.4	59	31	856	14.2	63	31	850	18.0	44	30	847	10.9	60	31	848	13.2	36
2,000	31	802	7.8	61	31	799	16.8	26	31	806	11.3	55	31	807	11.1	64	31	801	14.8	44	30	798	7.3	61	31	798	9.1	40
2,500	31	755	4.9	60	31	753	12.7	29	31	759	8.4	47	31	759	7.5	62	31	755	11.2	45	30	750	4.0	59	31	751	4.9	45
3,000	31	710	2.3	54	31	709	8.4	34	31	714	5.7	36	31	714	4.7	55	31	711	7.4	45	30	705	.9	55	31	706	.9	51
4,000	31	626	−3.4	49	31	627	−.5	48	31	631	.1	29	30	631	−1.3	48	31	629	−.1	48	29	622	−5.6	55	30	622	−6.5	58
5,000	31	551	−9.1	40	31	553	−9.0	63	31	557	−5.8	31	30	556	−6.9	40	31	554	−7.5	46	28	547	−11.3	47	29	547	−12.9	61
6,000	31	484	−15.4	39	29	485	−16.1	69	31	489	−12.2	29	29	488	−12.9	36	31	486	−14.2	39	28	480	−17.7		29	479	−19.8	52
7,000	31	423	−22.1	41	29	424	−22.9	49	31	428	−19.4	32	29	428	−20.4	42	31	426	−21.4	46	28	419	−25.3		28	418	−27.2	45
8,000	31	368	−29.6	46	29	369	−30.3		31	374	−27.1	36	27	373	−27.8	41	31	370	−28.9	49	28	364	−32.8		28	363	−34.5	
9,000	31	319	−37.0		27	320	−37.9		31	324	−34.8	43	27	324	−35.4		31	321	−36.8	51	27	314	−40.4		28	314	−41.8	
10,000	31	276	−44.7		27	276	−45.4		31	280	−42.5		26	280	−43.0		30	278	−44.4		26	271	−47.3		27	270	−48.7	
11,000	31	237	−52.2		26	237	−52.7		39	241	−49.5		25	241	−50.1		30	239	−51.9		25	233	−53.5		23	232	−53.2	
12,000	27	203	−58.5		24	202	−57.8		26	207	−55.5		22	207	−56.7		30	204	−58.7		22	199	−57.3		22	199	−56.7	
13,000	18	174	−63.6		12	172	−59.8		21	177	−60.1		14	177	−62.3		28	174	−61.5		17	170	−58.3		18	170	−56.3	
14,000	12	147	−64.1		6	147	−57.8		15	151	−62.7		11	151	−65.0		19	148	−62.0		17	145	−56.4		11	144	−53.9	
15,000	6	125	−61.7						7	129	−64.9						10	125	−62.6		14	123	−55.8		5	123	−54.9	
16,000																	6	107	−63.6		12	106	−57.1		5	106	−56.2	

Altitude (meters) m. s. l.	Brownsville, Tex. (6 m.)				Buffalo, N. Y. (221 m.)				Caribou, Maine (191 m.)				Charleston, S. C.[2] (14 m.)				Denver, Colo. (1616 m.)				Dodge City, Kans. (787 m.)				El Paso, Tex. (1195 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	1,013	23.8	85	31	992	15.3	76	29	904	10.4	66	31	1,018	20.0	91	31	836	14.3	53	27	922	17.2	78	31	879	23.1	23
500	31	957	20.6	81	31	960	15.3	67	29	958	11.2	53	31	963	19.9	72												
1,000	31	904	19.1	62	31	905	13.2	62	29	903	9.0	54	31	908	17.2	64					27	900	18.4	64				
1,500	31	852	17.7	44	31	852	10.5	61	29	850	5.9	58	31	856	14.0	61					27	849	16.1	54	31	850	22.2	33
2,000	31	803	14.9	40	31	802	7.9	50	29	798	2.5	65	31	806	11.2	59	31	798	13.0	45	27	800	12.9	53	31	801	18.1	24
2,500	31	757	12.2	34	31	754	4.5	63	29	750	−.4	64	31	759	8.3	57	31	752	9.4	45	27	753	9.2	54	31	755	13.8	27
3,000	31	713	9.1	32	31	710	2.1	58	29	704	−2.9	59	31	715	5.8	52	31	708	5.3	50	27	709	5.4	52	31	711	9.5	31
4,000	31	631	1.9	33	31	626	−3.4	55	29	620	−8.0	49	30	632	−.1	49	31	625	−2.5	62	26	626	−1.9	49	31	629	.8	43
5,000	31	557	−5.1	38	31	551	−9.1	51	29	545	−13.8	40	29	557	−6.1	46	31	550	−10.0	69	26	551	−8.8	45	31	555	−6.9	45
6,000	31	490	−11.9	41	30	484	−15.0	44	29	477	−21.0	36	28	489	−12.4	40	31	483	−17.0	65	26	484	−15.4	45	30	487	−14.0	38
7,000	30	429	−19.0	42	30	423	−22.1	48	29	416	−28.2	44	28	429	−19.4	36	30	422	−24.4	55	26	423	−22.6	41	30	426	−21.1	
8,000	30	374	−26.3	43	30	368	−29.3	51	29	361	−35.2		26	375	−26.4	39	29	366	−32.2	52	26	368	−29.8	41	30	372	−28.9	
9,000	30	325	−33.7	50	30	319	−36.9		29	312	−42.1		24	325	−34.1	41	27	316	−40.2		24	319	−37.3	45	30	322	−36.7	
10,000	30	282	−41.2		30	276	−44.6		29	268	−49.0		23	282	−41.7		26	274	−47.3		24	276	−44.6		29	278	−44.0	
11,000	30	242	−48.8		29	237	−52.4		26	230	−55.0		19	242	−49.3		23	235	−53.5		24	237	−51.1		27	240	−51.4	
12,000	30	207	−55.7		27	202	−58.6		19	196	−57.7		17	208	−55.9		17	200	−57.8		24	202	−57.3		20	206	−57.2	
13,000	29	177	−60.8		20	173	−62.7		10	166	−56.9		15	177	−60.9		16	171	−59.4		23	172	−60.2		9	176	−61.4	
14,000	25	152	−64.5		12	148	−64.0		6	142	−56.2		9	152	−63.4		9	146	−57.2		20	147	−58.2					
15,000	22	128	−66.1		6	126	−62.1						5	129	−62.2		7	125	−58.9		17	126	−58.6					
16,000	12	108	−67.6														6	107	−60.5		8	108	−60.6					
17,000																	5	91	−61.4									

Altitude (meters) m. s. l.	Ely, Nev.[2] (1,908 m.)				Glasgow, Mont. (648 m.)				Great Falls, Mont. (1,128 m.)				Greensboro, N. C. (273 m.)				Hatteras, N. C. (3 m.)				Huntington, W. Va. (172 m.)				Int'l Falls, Minn. (343 m.)			
	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity	Number of observations	Pressure	Temperature	Relative humidity
Surface	30	807	11.7	46	31	937	16.0	60	31	885	14.0	51	30	988	18.8	78	31	1,019	20.5	80	30	998	17.5	86	31	974	12.4	71
500													30	961	20.4	61	31	962	18.8	73	30	960	19.3	66	31	956	12.7	63
1,000					31	899	14.6	54					30	908	17.2	59	31	908	16.2	61	30	906	16.8	58	31	900	9.8	64
1,500					31	847	11.1	55	31	847	11.9	47	30	856	13.4	67	31	856	13.3	56	30	854	13.0	63	31	848	7.2	70
2,000	30	799	11.7	46	31	797	7.7	60	31	797	8.7	48	30	806	10.2	60	31	806	10.2	55	30	804	9.8	63	31	797	4.7	68
2,500	30	752	9.5	45	31	750	3.9	66	31	750	4.7	54	30	759	7.4	53	31	759	7.1	48	30	757	6.6	58	31	749	2.0	63
3,000	30	708	5.5	46	31	705	.1	71	31	705	.9	62	30	714	4.2	51	31	714	4.6	39	29	712	3.2	54	31	704	−.8	61
4,000	30	625	−2.5	49	31	622	−6.6	72	31	622	−6.4	68	30	630	−2.3	43	31	630	−1.5	36	28	629	−3.1	46	31	621	−6.3	57
5,000	30	550	−10.5	52	31	546	−12.9	62	30	546	−13.4	63	30	555	−8.1	43	30	555	−7.7	38	26	554	−9.3	42	31	546	−12.5	48
6,000	29	482	−16.7	50	31	478	−19.5	54	30	478	−20.4	57	30	488	−14.2	40	29	487	−14.3	34	26	486	−15.3	46	30	478	−19.0	47
7,000	28	422	−24.3	50	31	417	−26.9	47	30	416	−27.7	51	30	427	−21.3	43	29	427	−21.2	33	26	425	−22.3	45	30	418	−26.2	
8,000	27	367	−31.6	43	31	362	−34.2	50	30	362	−35.0		30	372	−28.6	43	26	371	−28.7		26	370	−29.1	46	29	363	−33.3	
9,000	27	317	−39.5		31	313	−41.6		28	313	−42.3		30	322	−36.3		26	322	−36.5		24	320	−36.8		29	314	−40.9	
10,000	27	274	−46.8		29	270	−48.5		27	269	−49.5		29	278	−44.4		24	278	−44.3		23	277	−44.5		28	270	−47.7	
11,000	24	235	−53.5		26	232	−53.5		16	233	−53.2		26	240	−51.8		20	239	−51.8		23	238	−52.2		28	232	−53.4	
12,000	20	200	−57.5		22	198	−56.6		11	199	−54.9		21	204	−58.5		14	204	−58.2		21	203	−59.6		25	298	−57.3	
13,000	15	171	−59.9		19	169	−56.2		8	171	−54.1		15	173	−63.8						19	173	−64.0		19	170	−57.4	
14,000	12	145	−59.0		15	145	−54.6		7	146	−53.8		9	148	−65.2						13	146	−64.2		14	146	−56.2	
15,000	8	124	−58.6						5	125	−54.2		5	125	−64.2						9	124	−61.6		11	126	−56.6	
16,000	6	107	−59.4																		7	106	−61.6		8	108	−57.0	
17,000	5	91	−59.2																									

See footnotes at end of table.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent, obtained by radiosondes during May 1944*—Continued

STATIONS AND ELEVATIONS IN METERS ABOVE SEA LEVEL—Continued

	Jackson, Miss. (97 m.)				Joliet, Ill. (178 m.)				Lake Charles, La. (5 m.)				Lakehurst, N. J.[1] (39 m.)				Little Rock, Ark. (79 m.)				Louisville, Ky. (166 m.)				Mazatlan, Mexico (80 m.)			
Surface	31	1005	21.1	81	31	994	16.3	85	31	1016	21.6	86	30	1014	15.8	79	31	1006	20.5	82	31	998	20.1	76	31	1004	24.3	80
500	31	960	21.0	66	31	958	17.3	78	31	959	19.6	74	30	961	17.0	69	31	959	20.4	65	31	960	20.6	64	31	957	22.8	52
1,000	31	906	17.8	65	31	904	14.6	77	31	905	17.7	61	30	906	15.0	64	31	905	17.1	66	31	906	17.2	66	31	904	23.1	36
1,500	31	854	14.4	67	31	852	11.5	74	31	854	15.0	57	30	855	12.4	58	31	853	13.6	69	31	854	13.3	72	31	853	20.6	34
2,000	31	805	11.6	56	31	801	8.9	67	31	804	12.3	53	30	804	9.7	56	31	804	10.7	59	31	804	10.0	71	31	805	17.7	35
2,500	31	758	8.6	50	31	754	5.9	64	31	758	9.5	46	30	757	6.7	51	31	756	7.9	48	31	757	6.8	64	31	759	14.6	31
3,000	31	713	5.3	51	31	710	3.2	61	31	713	6.6	41	30	712	4.1	48	31	712	5.0	44	31	712	3.7	56	31	715	11.2	32
4,000	30	630	−.8	45	31	626	−3.2	54	31	630	.4	37	30	629	−2.3	47	31	629	−1.4	45	31	629	−2.4	53	30	633	3.6	35
5,000	29	556	−6.6	38	31	552	−9.1	50	31	556	−6.1	35	29	554	−8.6	42	31	554	−7.6	45	31	554	−7.9	48	30	559	−2.9	38
6,000	29	488	−13.1	42	31	484	−15.0	41	31	488	−12.6	39	29	486	−14.8	45	31	486	−14.1	40	31	487	−13.8	39	28	492	−9.7	53
7,000	29	428	−19.7	48	31	424	−21.5	46	31	428	−19.7	35	29	426	−21.4	46	31	426	−20.9	37	31	426	−20.7	35	26	432	−17.0	58
8,000	29	373	−27.0	46	30	369	−28.5	49	31	373	−27.1	40	23	371	−28.6		31	371	−28.2	41	31	371	−27.9	39	23	377	−24.3	48
9,000	29	323	−35.0		30	320	−35.9		31	324	−34.7	44	23	321	−36.3		31	322	−35.9		31	322	−35.2	40	22	328	−31.2	61
10,000	29	280	−42.8		28	277	−43.3		31	280	−42.3		22	279	−44.2		31	278	−43.7		30	279	−42.4		22	284	−38.8	
11,000	28	241	−50.4		27	239	−50.6		31	241	−50.0		21	240	−51.7		30	239	−51.4		24	241	−49.0		21	245	−46.3	
12,000	27	206	−57.5		25	204	−57.1		31	206	−57.3		18	205	−58.8		28	205	−58.6		15	208	−56.1		15	211	−53.0	
13,000	26	176	−62.6		18	173	−61.5		31	176	−61.5		11	174	−63.9		24	175	−63.2		13	178	−62.5		6	182	−58.5	
14,000	22	150	−64.2		13	148	−62.0		27	149	−63.6		5	149	−63.5		20	148	−63.2		6	151	−67.5					
15,000	13	127	−64.1		10	125	−59.3		24	126	−65.1						12	128	−61.3									
16,000	7	108	−64.7						19	107	−65.6						6	107	−62.2									
17,000									11	92	−65.5																	
18,000									5	77	−66.2																	

	Medford, Oreg.[2] (409 m.)				Miami, Fla.[1] (4 m.)				Nashville, Tenn. (180 m.)				Norfolk, Va.[1] (4 m.)				Oakland, Calif. (2 m.)				Ogden, Utah (1,355 m.)				Oklahoma City, Okla. (391 m.)			
Surface	31	968	16.9	46	31	1018	22.5	83	31	997	21.1	71	22	1019	21.4	74	31	1015	14.5	72	31	862	14.9	50	31	968	19.2	75
500	31	957	16.4	46	31	961	20.6	86	31	960	20.8	60	22	962	20.7	62	31	957	13.1	61					31	955	19.6	68
1,000	31	903	12.9	47	31	907	17.3	83	31	906	17.5	62	22	908	18.1	56	31	901	13.1	44					31	902	17.6	60
1,500	31	850	9.0	52	31	855	14.4	80	31	855	14.0	65	22	856	15.0	53	31	849	11.1	33	31	848	14.8	44	31	851	15.3	53
2,000	31	800	5.1	59	31	806	11.9	73	31	805	10.5	69	22	806	11.9	50	31	799	8.8	27	31	799	11.3	43	31	801	12.4	50
2,500	31	752	2.0	61	31	759	9.4	66	31	758	7.0	68	22	759	9.1	43	31	752	5.9	28	31	752	7.2	46	31	754	8.9	49
3,000	31	706	−.6	60	31	714	6.8	62	31	713	3.7	65	22	714	6.6	40	31	707	3.0	26	31	707	3.1	52	30	710	5.3	48
4,000	31	623	−5.9	51	30	632	1.5	55	31	630	−2.0	54	22	632	−.1	40	31	624	−3.4	28	31	624	−4.7	61	27	628	−1.4	43
5,000	30	547	−12.3	50	30	558	−4.2	49	31	555	−7.4	47	22	557	−6.7	39	31	550	−10.1	34	31	549	−11.8	62	27	553	−8.3	44
6,000	30	479	−18.5	49	30	490	−10.7	45	31	488	−13.4	44	22	489	−13.2	40	31	482	−16.6	36	31	481	−18.8	58	27	485	−14.9	42
7,000	29	419	−24.9	48	30	430	−17.7	43	31	427	−20.4	45	20	428	−19.5	38	31	422	−24.0	37	31	420	−26.0	54	27	425	−22.0	
8,000	28	364	−32.8	48	30	376	−24.9	42	31	372	−27.4	42	18	373	−26.4	41	31	366	−31.5	42	30	365	−33.1	45	25	370	−29.4	
9,000	28	314	−40.4		30	326	−32.3	42	31	322	−35.0		17	324	−33.8	37	31	317	−39.3		30	316	−40.8		24	321	−36.7	
10,000	28	271	−47.6		30	283	−39.7		31	279	−42.5		16	281	−41.1		31	274	−46.9		30	272	−48.4		24	277	−44.4	
11,000	26	233	−53.6		30	244	−46.9		31	240	−50.0		13	242	−49.1		31	235	−53.4		30	233	−54.3		24	238	−52.2	
12,000	22	199	−57.3		28	209	−53.5		30	206	−57.1		11	208	−55.4		30	201	−58.5		30	199	−57.6		23	204	−58.7	
13,000	19	170	−58.4		24	179	−58.5		30	175	−62.4		7	178	−61.2		30	171	−59.7		28	170	−57.6		16	174	−62.2	
14,000	14	144	−57.0		21	153	−62.2		27	149	−63.4						28	146	−59.4		26	145	−56.6		6	150	−61.7	
15,000	12	123	−57.4		15	130	−64.2		17	126	−62.4						24	124	−59.6		21	124	−56.8					
16,000	11	105	−57.2		11	110	−66.5		15	107	−62.4						19	106	−59.6		17	106	−57.6					
17,000	9	90	−57.2		7	93	−68.6		6	90	−61.4						12	90	−58.5		11	91	−59.4					

	Omaha, Nebr. (301 m.)				Phoenix, Ariz. (339 m.)				Pittsburgh, Pa. (392 m.)				Portland, Maine[2] (20 m.)				Rapid City, S. Dak. (981 m.)				St. Louis, Mo. (171 m.)				St. Paul, Minn. (225 m.)			
Surface	31	978	19.0	72	31	970	24.8	31	31	972	18.5	68	31	1016	10.8	86	31	901	13.5	70	31	996	19.8	75	31	987	16.3	74
500	31	955	18.3	68	31	952	26.8	19	31	960	18.8	65	31	959	14.3	64					31	958	19.2	66	31	956	15.3	69
1,000	30	901	15.9	67	31	899	23.3	19	31	906	16.5	61	31	904	12.3	56	31	899	13.8	67	31	904	15.1	67	31	901	12.9	72
1,500	30	850	12.6	68	31	849	19.0	23	31	854	13.3	65	31	852	9.4	55	31	848	12.7	53	31	852	12.9	68	31	848	10.0	71
2,000	30	800	9.7	66	31	800	14.7	26	31	804	10.0	67	31	801	6.3	55	31	798	9.2	57	31	802	9.8	60	31	798	7.2	67
2,500	29	753	6.8	62	31	754	10.3	31	31	757	6.7	65	31	754	3.5	54	31	751	5.7	56	31	755	6.7	56	31	751	4.4	64
3,000	28	708	4.4	58	31	710	6.0	35	31	712	3.9	59	31	709	.9	54	31	706	2.3	56	31	710	3.6	54	31	706	1.7	58
4,000	28	626	−1.9	57	31	627	−1.3	33	30	629	−2.0	54	30	625	−4.9	54	31	623	−4.6	51	31	627	−2.0	52	31	624	−3.9	50
5,000	27	552	−8.8	51	31	552	−8.1	30	30	554	−8.0	51	30	550	−10.9	51	29	548	−11.2	49	31	552	−7.7	45	31	549	−9.8	46
6,000	27	484	−14.7	43	31	485	−15.1	28	30	486	−13.9	49	29	482	−17.2	45	29	480	−17.9	47	31	485	−14.2	41	31	481	−16.1	40
7,000	27	424	−21.5	46	31	424	−22.7		30	426	−20.7	50	28	421	−24.2	44	29	419	−25.4	49	31	425	−21.1	39	31	420	−23.5	40
8,000	27	369	−28.5	46	31	369	−30.5		30	371	−28.0	51	28	366	−31.5	43	29	364	−33.2	54	31	370	−28.3	39	30	366	−31.0	44
9,000	27	320	−35.9		30	320	−38.3		30	321	−35.7		27	316	−39.1		28	314	−40.8		31	321	−35.8	41	29	317	−38.5	
10,000	27	277	−43.8		30	276	−45.8		30	278	−43.7		24	273	−46.9		26	272	−47.5		31	277	−43.4		29	274	−45.8	
11,000	27	238	−51.2		28	237	−52.6		30	239	−51.4		21	235	−53.8		21	233	−53.6		31	238	−51.0		28	236	−52.0	
12,000	27	204	−57.3		24	202	−56.8		30	204	−58.5		19	200	−59.6		14	199	−57.4		31	204	−57.7		27	201	−57.3	
13,000	23	174	−60.6		19	173	−59.2		28	174	−63.3		18	171	−62.4		9	170	−58.7		31	174	−62.3		27	172	−59.9	
14,000	20	148	−59.4		15	147	−59.5		25	148	−64.3		13	145	−62.7		6	144	−56.2		26	147	−62.3		24	147	−58.7	
15,000	17	126	−58.6		9	126	−60.5		15	125	−61.5		9	123	−61.3						24	125	−60.8		17	126	−57.5	
16,000	17	107	−59.2		7	107	−61.9		10	107	−61.2										19	107	−61.0		10	108	−58.1	
17,000	10	92	−60.1																		16	91	−61.6		8	93	−59.4	
18,000	6	78	−60.5																		12	78	−62.6					
19,000																					5	66	−63.4					

	San Antonio, Tex. (242 m.)				San Diego, Calif.[1] (19 m.)				San Juan, P. R. (15 m.)				Santa Maria, Calif. (71 m.)				S. S. Marie, Mich.[2] (221 m.)				Seattle, Wash.[1] (22 m.)				Spokane, Wash. (598 m.)			
Surface	31	986	21.6	79	31	1,012	16.0	73	31	1,014	25.0	80	31	1,008	12.7	83	31	990	10.5	77	30	1,014	15.8	56	31	944	15.7	50
500	31	957	20.5	76	31	956	13.3	80	31	959	20.7	84	31	958	11.5	79	31	958	11.8	72	30	958	12.2	54				
1,000	31	903	18.3	68	31	901	13.5	64	31	905	16.9	83	31	902	12.9	50	31	902	10.5	68	30	902	8.6	58	31	900	13.1	45
1,500	31	853	15.9	65	31	850	13.3	44	31	854	14.3	77	31	850	11.5	38	31	850	8.1	66	30	849	5.3	65	31	847	8.9	50
2,000	31	803	13.7	51	31	800	11.3	32	31	805	12.0	71	31	800	8.7	34	31	799	5.4	66	30	798	2.0	59	31	797	4.8	56
2,500	31	757	11.2	39	31	754	8.5	30	31	758	10.8	55	31	753	6.1	30	31	752	2.9	64	30	750	−1.2	58	31	749	1.2	59
3,000	31	712	8.1	29	31	709	5.4	34	31	714	8.5	48	31	708	2.9	32	31	706	.4	62	30	704	−3.8	59	31	704	−2.4	65
4,000	31	630	1.3	27	31	627	−.5		29	632	3.0	49	31	625	−3.1	32	31	623	−4.7	60	30	620	−9.3	55	31	620	−8.8	62
5,000	30	556	−5.5	32	31	552	−7.1		27	558	−2.7	46	31	550	−9.4	32	30	548	−10.3	55	30	544	−15.1	48	31	544	−14.7	60
6,000	28	489	−12.2	29	29	485	−13.9		26	491	−8.5	41	31	482	−16.3	33	30	481	−16.9	51	30	475	−22.0	50	31	476	−21.4	56
7,000	28	428	−19.3	33	28	424	−21.3		26	431	−15.2	48	31	422	−23.8	31	29	420	−23.6	47	29	414	−29.1	49	30	415	−28.8	51
8,000	28	374	−26.7	38	18	370	−28.6		26	376	−21.8	47	31	367	−31.2		29	366	−30.7	46	28	360	−36.0		27	361	−35.3	55
9,000	28	324	−34.1		18	320	−36.3		26	328	−28.5		31	318	−39.0		25	316	−38.5	44	28	310	−42.7		26	312	−42.7	
10,000	28	280	−41.8		18	277	−43.7		26	285	−35.9		29	275	−46.5		23	273	−45.4		28	268	−49.2		24	268	−49.5	
11,000	28	241	−49.3		16	238	−50.4		21	246	−43.6		29	236	−53.6		19	237	−51.5		26	229	−53.8		20	231	−55.2	
12,000	27	207	−55.8		8	205	−55.9		19	212	−51.4		29	202	−59.0		13	203	−55.8		23	196	−56.6		19	197	−57.3	
13,000	26	176	−60.7		6	174	−59.8		11	181	−59.4		29	172	−60.9		11	174	−60.3		21	168	−58.2		12	168	−54.6	
14,000	21	150	−62.4										28	146	−60.8		8	148	−60.5		20	144	−57.9		7	145	−53.9	
15,000	7	128	−64.6										23	124	−60.6						17	122	−58.2					
16,000													18	106	−60.6						13	105	−56.6					
17,000													8	90	−61.6						6	90	−56.3					
18,000													5	77	−61.0						5	77	−56.1					

See footnotes at end of table.

TABLE 1.—*Mean free-air barometric pressure in millibars, temperature in degrees centigrade, and relative humidities in percent obtained by radiosondes during May 1944*—Continued

STATIONS AND ELEVHTIONS IN METERS ABOVE SEA LEVEL—Continued

	Swan Island, W. I. (10 m.)				Tacubaya, Mexico (2,306 m.)				Tampa, Fla. (3 m.)			
Surface	31	1,013	26.0	79	31	774	17.3	52	31	1,018	23.1	77
500	31	958	22.2	81					31	962	20.2	70
1,000	31	904	19.2	71					31	908	17.2	69
1,500	31	854	16.5	63					31	856	13.9	73
2,000	31	804	14.1	49					31	806	11.2	67
2,500	31	758	11.6	41	31	756	16.0	50	31	759	8.8	56
3,000	31	714	9.0	36	31	713	12.1	53	31	714	6.1	47
4,000	31	632	3.8	34	31	632	3.7	69	31	631	.4	38
5,000	31	558	−2.3	31	30	558	−3.4	77	31	557	−5.8	34
6,000	30	491	−7.5	32	30	491	−10.0	69	31	489	−12.2	29
7,000	30	431	−13.6	32	30	431	−16.0	57	31	429	−19.2	38
8,000	29	378	−20.1	32	30	376	−23.0	44	30	374	−26.8	43
9,000	29	328	−27.4		29	327	−30.0	47	29	324	−34.7	
10,000	28	286	−35.3		29	285	−37.5		29	280	−42.7	
11,000	26	247	−43.5		28	245	−45.3		29	241	−50.3	
12,000	26	212	−51.8		26	211	−53.3		25	207	−56.0	
13,000	23	181	−59.6		23	180	−60.4		16	177	−60.8	
14,000	11	155	−65.9		17	153	−66.3					
15,000												

	Tapachula, Mexico (115 m.)				Tatoosh Island, Wash. (31 m.)				Toledo, Ohio (191 m.)				Tongue Point, Oreg.[1] (21 m.)			
Surface	31	998	25.8	85	29	1,014	10.1	85	31	994	15.9	82	23	1,017	13.8	64
500	31	955	24.2	82	29	958	8.7	74	31	959	16.6	70	23	960	10.5	62
1,000	31	902	21.2	82	29	902	6.6	67	31	904	14.6	69	23	905	7.4	61
1,500	31	852	18.5	80	29	848	3.9	63	31	853	11.6	69	23	851	4.6	59
2,000	31	803	15.6	80	29	797	1.1	61	31	803	8.7	68	23	800	1.8	55
2,500	31	757	12.9	78	29	749	−1.6	57	31	755	6.0	63	23	752	−.8	45
3,000	31	713	9.9	75	29	703	−4.1	56	31	711	3.2	56	23	706	−3.0	42
4,000	31	632	3.7	72	29	619	−9.7	54	31	627	−2.8	45	23	621	−8.7	42
5,000	30	558	−2.0	59	29	543	−15.5		31	552	−8.8	47	22	546	−14.4	37
6,000	30	492	−7.1	37	28	475	−22.3		31	484	−15.1	48	21	479	−20.9	38
7,000	30	432	−13.3	36	28	413	−29.5		31	424	−22.2	49	19	417	−28.2	
8,000	30	378	−20.4	38	28	358	−36.3		31	369	−29.4	48	9	362	−34.6	
9,000	29	329	−27.7	40	25	310	−42.8		31	320	−37.0		8	313	−41.4	
10,000	27	286	−35.6		24	267	−48.6		30	276	−44.5		8	270	−47.4	
11,000	26	247	−43.6		22	229	−52.1		26	238	−51.0		5	233	−54.4	
12,000	25	212	−51.5		18	196	−54.1		15	205	−55.9					
13,000	22	182	−59.7		16	167	−53.9		11	176	−60.7					
14,000	17	154	−67.3		9	143	−52.7		6	148	−62.7					
15,000	8	131	−72.7		6	122	−52.0									

Altitude (meters) m. s. l.	Washington, D. C. (25 M.)			
	Number of observations	Pressure	Temperature	Relative humidity
Surface	31	1,016	20.3	69
500	31	962	19.5	59
1,000	31	907	16.9	61
1,500	31	856	13.8	62
2,000	31	806	10.5	60
2,500	31	758	7.5	55
3,000	31	714	4.6	48
4,000	31	630	−1.5	41
5,000	31	555	−8.1	45
6,000	31	488	−14.4	44
7,000	31	427	−21.1	41
8,000	31	372	−28.3	39
9,000	31	322	−35.8	
10,000	31	279	−44.0	
11,000	31	240	−52.1	
12,000	30	205	−59.4	
13,000	25	174	−64.8	
14,000	13	148	−65.6	
15,000	6	126	−64.3	

[1] U. S. Navy.

[2] Humidity data obtained by hair hygrometer, others using electric hygrometer.

NOTE.—All observations taken near 11 p. m., E. S. T. except at Mazatlan and Tapachula, Mexico, where they are taken near 9 p. m. "Number of observations" refers to pressure only, as temperature and humidity data are sometimes missing for some observations at certain levels. Relative humidity data are not used in daily observations when the temperature is below −40.0° C.

None of the means included in these tables are based on less than 15 surface or 5 standard level observations.

Means for observations obtained by the electric hygrometer have been adjusted to compensate for the values occurring below the operating range of the humidity element.

TABLE 2.—*Free-air resultant winds based on pilot-balloon observations made near 5 p. m. (75th meridian time) during May 1944. Directions given in degrees from North (N=360°, E=90°, S=180°, W=270°). Velocities in meters per second.*

Altitude (meters) m. s. l.	Abilene, Tex. (538 m.)			Albuquerque, N. Mex. (1,630 m.)			Atlanta, Ga. (299 m.)			Billings, Mont. (1,095 m.)			Bismarck, N. Dak. (512 m.)			Boise, Idaho (870 m.)			Brownsville, Tex. (7 m.)			Buffalo, N. Y. (220 m.)			Burlington, Vt. (132 m.)			Charleston, S. C. (17 m.)			Cincinnati, Ohio (152 m.)			Denver, Colo. (1,627 m.)			El Paso, Tex. (1,196 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	31	183	4.5	31	219	2.2	30	201	0.9	31	327	0.9	31	77	0.8	31	318	4.7	31	125	6.3	29	303	1.7	31	213	1.8	31	159	1.9	31	223	1.8	31	287	4.2	31	235	3.2
500							30	195	1.8										31	132	6.9	29	278	3.0	31	219	4.0	31	161	3.4	31	231	3.6						
1,000	31	179	7.0				30	184	1.9				31	94	1.0	31	312	5.1	24	143	6.5	27	259	4.4	30	231	4.8	30	174	2.0	31	233	4.4						
1,500	31	188	7.1				29	182	1.8	31	293	1.2	31	113	.8	31	300	3.8	22	147	5.5	27	255	5.9	29	256	5.8	30	210	1.0	29	239	4.9				31	239	4.4
2,000	29	209	6.2	31	230	2.6	29	209	1.9	30	251	1.4	30	158	1.6	31	286	3.3	18	143	2.7	25	259	6.9	27	268	7.2	30	280	.6	26	252	6.3	31	40	0.4	31	251	5.5
2,500	26	221	5.2	31	230	3.3	27	223	2.1	30	262	2.2	27	185	.6	31	268	2.9	18	207	1.3	23	260	8.1	25	281	9.3	28	290	1.2	20	268	6.3	31	339	.7	31	240	4.6
3,000	24	244	5.8	31	232	3.9	25	229	2.8	28	250	3.1	21	229	1.2	29	233	2.8	17	266	2.0	21	270	8.8	16	296	11.3	28	321	1.3	19	261	5.8	30	307	.8	31	236	4.7
4,000	18	266	8.5	25	243	7.6	18	242	2.2	25	261	5.3	16	312	2.7	27	230	5.0	15	259	4.2	19	277	12.8	10	302	12.0	24	312	.9				26	269	3.5	28	237	6.8
5,000	16	273	8.3	16	241	9.3	12	287	4.7	20	249	6.0	10	321	6.0	22	238	5.4	13	280	6.7	12	296	12.8				20	346	1.3				22	249	6.6	25	245	8.9
6,000	16	274	10.1	11	227	9.5	10	289	5.9	17	252	7.0	10	318	8.8	20	267	6.1	13	282	8.6							18	14	3.6				16	261	8.5	19	252	10.8
8,000																12	281	3.2	12	275	13.1													10	251	9.4	10	264	12.5

Altitude (meters) m. s. l.	Ely, Nev. (1,910 m.)			Grand Junction, Colo. (1,413 m.)			Greensboro, N. C. (271 m.)			Havre, Mont. (767 m.)			Jacksonville, Fla. (16 m.)			Joliet, Ill. (178 m.)			Las Vegas, Nev. (573 m.)			Little Rock, Ark. (88 m.)			Medford, Oreg. (410 m.)			Miami, Fla. (15 m.)			Mobile, Ala. (66 m.)			Nashville, Tenn. (194 m.)			New York, N. Y. (15 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	31	197	3.4	31	300	0.8	31	197	2.9	31	213	1.4	31	95	4.6	30	190	2.3	31	207	1.8	30	169	2.1	31	320	1.7	31	88	3.9	30	171	2.6	31	208	2.6	28	170	4.3
500							31	189	3.5				31	100	4.6	30	198	2.5				30	182	3.2	31	314	2.3	31	85	6.0	30	175	3.6	31	221	3.7	28	215	4.8
1,000							31	188	3.0	31	228	1.5	31	102	3.7	28	207	4.6	31	193	3.0	28	195	5.5	31	323	1.8	31	77	4.7	29	178	2.9	30	220	4.1	26	242	5.7
1,500				31	303	1.2	31	207	2.6	31	239	1.7	30	103	2.1	23	230	5.9	31	196	4.2	27	203	6.6	31	296	1.7	31	49	3.0	26	197	1.1	30	222	4.4	26	260	6.8
2,000	31	196	3.2	31	303	1.5	30	223	3.1	27	239	2.9	29	92	1.1	19	257	6.0	31	198	4.2	23	219	7.0	29	262	1.5	28	24	2.6	23	236	1.0	27	229	4.8	25	277	6.5
2,500	31	197	4.1	31	259	2.3	28	239	3.6	25	246	3.9	26	113	0.7	17	262	6.8	31	209	4.5	21	216	7.2	27	264	1.8	27	2	2.0	21	186	0.1	24	232	5.3	21	286	8.0
3,000	31	212	4.0	31	239	3.5	27	261	4.3	22	240	5.0	24	102	1.2	13	263	7.3	30	212	4.6	20	210	7.0	25	274	2.7	23	339	2.3	17	85	1.9	19	228	5.6	16	275	9.1
4,000	25	227	5.4	21	235	6.6	21	246	5.5	15	240	7.9	22	168	0.2				30	235	4.5	13	194	7.5	22	301	4.6	20	308	2.8	10	278	1.0	15	256	4.5	10	286	9.9
5,000	13	241	4.7	14	244	5.4	15	267	6.2				21	314	1.9				27	246	5.7	11	205	7.0	18	307	8.5	17	313	2.2									
6,000	10	221	6.1				13	287	6.4				20	331	1.7				26	251	6.4				17	312	8.6	16	288	3.3									
8,000													15	288	4.4				22	281	6.8				13	296	9.3	13	298	5.6									
10,000													14	268	6.9				21	294	8.9																		
12,000													11	282	9.3				13	279	12.0																		

Altitude (meters) m. s. l.	Oakland, Calif. (8 m.)			Oklahoma, City, Okla. (402 m.)			Omaha, Nebr. (306 m.)			Phoenix, Ariz. (338 m.)			Rapid City S. Dak. (982 m.)			St. Louis, Mo. (181 m.)			St. Paul, Minn. (225 m.)			San Antonio, Tex. (240 m.)			San Diego, Calif. (15 m.)			Sault St. Marie, Mich. (225 m.)			Seattle, Wash. (12 m.)			Spokane, Wash. (603 m.)			Washington, D. C. (24 m.)		
	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity	Observations	Direction	Velocity
Surface	30	258	5.7	30	169	5.5	31	187	3.0	31	239	1.2	29	9	1.9	31	227	2.7	29	165	1.3	30	143	4.2	31	266	3.8	28	177	0.8	29	268	2.6	30	216	1.9	31	186	2.4
500	29	276	3.8	30	175	6.2	31	186	3.6	31	235	1.8				31	217	3.3	29	164	1.7	30	136	4.8	31	278	2.5	28	211	1.6	29	257	1.6				31	193	4.0
1,000	27	280	1.7	29	185	7.0	31	201	3.6	31	227	1.4	29	10	1.8	31	221	4.3	26	183	3.5	28	152	5.9	23	212	.4	27	249	3.9	29	215	2.3	30	231	2.2	29	206	3.9
1,500	25	304	2.0	27	207	7.8	27	202	5.1	31	219	2.0	29	342	1.5	28	217	5.2	22	227	2.7	22	164	5.4	19	204	.8	25	250	4.6	25	203	2.5	29	231	2.8	26	232	4.2
2,000	24	292	2.2	26	222	8.1	23	237	4.9	31	211	3.4	29	306	.9	25	227	5.8	20	251	3.6	20	178	4.0	18	202	1.7	23	254	5.7	24	196	2.8	26	225	3.7	24	254	4.4
2,500	23	324	1.5	22	236	7.3	21	260	5.6	31	209	3.9	25	268	2.4	21	245	7.5	18	252	4.4	13	248	3.9	17	225	1.9	19	260	6.6	22	218	2.3	23	220	4.6	21	279	5.6
3,000	23	329	2.5	21	244	7.8	17	280	6.6	31	216	4.3	22	275	4.5	17	249	6.5	14	255	5.6	12	270	4.7	17	240	3.1	17	269	8.1	20	203	4.0	20	222	4.7	18	286	6.7
4,000	22	324	3.7	20	249	6.7	15	288	7.8	31	226	5.3	17	285	5.2	14	259	5.1	11	275	7.4	11	283	7.3	16	238	4.5	14	288	10.6	12	271	4.0	18	222	5.2	16	296	7.3
5,000	20	310	3.6	19	270	8.5	12	276	9.8	28	233	6.0	12	309	5.7	10	261	6.5							12	229	6.0							16	224	7.0			
6,000	17	292	4.4	15	275	8.4				26	249	8.3	12	283	5.0																			15	219	11.0			
8,000	14	254	4.7							20	256	10.8																						12	238	9.0			
10,000	13	261	7.5							17	258	15.1																											
12,000										11	255	16.8																											

TABLE 3.—*Maximum free-air wind velocities (m. p. s.), for different sections of the United States based on pilot-balloon observations during May 1944*

Section	Surface to 2,500 meters (m. s. l.)					Above 2,500 to 5,000 meters (m. s. l.)					Above 5,000 meters (m. s. l.)				
	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station	Maximum velocity	Direction	Altitude (m.) m. s. l.	Date	Station
Northeast [1]	34.0	NW.	1,740	18	Portland, Maine	44.4	WNW.	4,700	18	Portland, Maine	57.6	NNW.	17,335	25	Mount Washington, N. H.
East-Central [2]	29.2	SSW.	1,634	2	Nashville, Tenn	33.0	WSW.	4,950	8	Huntington, W. Va	33.0	WSW.	5,119	8	Huntington, W. Va.
Southeast [3]	27.8	SW.	2,301	6	Charlotte, N. C	32.0	W.	2,909	6	Atlanta, Ga	55.9	WSW.	14,876	15	Jacksonville, Fla.
North-Central [4]	44.0	SW.	1,900	4	Alpena, Mich	36.7	NNE.	5,000	4	Bismarck, N. Dak	44.0	NNE.	6,267	4	Bismarck, N. Dak.
Central [5]	36.2	S.	2,283	10	Goodland, Kans	42.0	S.	4,263	17	Goodland, Kans	40.0	SW.	11,878	19	Wichita, Kans.
South-Central [6]	38.2	NW.	1,556	5	Tulsa, Okla	38.4	SSW.	3,892	17	Amarillo, Tex	50.0	WNW.	13,027	7	Brownsville, Tex.
	38.2	SSE.	1,821	2	Texarkana, Ark										
Northwest [7]	43.5	SW.	2,442	15	Burns, Oreg	41.8	NW.	5,000	1	Boise, Idaho	67.8	SW.	6,358	12	Spokane, Wash.
West-Central [8]	27.2	SSW.	2,500	31	Modena, Utah	34.4	WSW.	5,000	22	Winnemucca, Nev	58.0	SSW.	10,143	13	Oakland, Calif.
Southwest [9]	41.5	SSW.	2,310	9	Tucson, Ariz	57.5	W.	4,190	18	Raton, N. Mex	46.0	WSW.	12,635	9	Albuquerque, N. Mex.
											46.0	NW.	9,943	3	Winslow, Ariz.

[1] Maine, Vermont, New Hampshire, Massachusetts, Rhode Island, Connecticut, New York, New Jersey, Pennsylvania, and Northern Ohio.
[2] Delaware, Maryland, Virginia, West Virginia, Southern Ohio, Kentucky, eastern Tennessee, and North Carolina.
[3] South Carolina, Georgia, Florida, and Alabama.
[4] Michigan, Wisconsin, Minnesota, North Dakota, and South Dakota.
[5] Indiana, Illinois, Iowa, Nebraska, Kansas, and Missouri.
[6] Mississippi, Arkansas, Louisiana, Oklahoma, Texas (except El Paso), and western Tennessee.
[7] Montana, Idaho, Washington, and Oregon.
[8] Wyoming, Colorado, Utah, northern Nevada and northern California.
[9] Southern California, southern Nevada, Arizona, New Mexico, and extreme west Texas.

RIVER STAGES AND FLOODS

By BENNETT SWENSON

MOST of the Mississippi Valley States and the West Gulf area had above normal precipitation during May, while in the Atlantic States the amounts were decidedly scanty. The greatest moisture deficiencies occurred from southern New England southward to eastern North Carolina. On the other hand, some northern central States had the wettest May in more than 50 years, and West Gulf sections in excess of twice the normal.

The excess of precipitation in the Central States resulted in severe floods in many streams in the Mississippi Valley for the second consecutive month. Record high stages were approached in many streams and exceeded in a few, in the upper Mississippi River basin and in eastern Texas. Notable among the streams in high flood were the Skunk and Des Moines Rivers in Iowa, the Mississippi River from Burlington, Iowa, to Louisiana, Mo., and the Sabine and Neches Rivers in Texas.

Atlantic Slope drainage.—Whereas precipitation in March and April was above normal, amounts during May were decidedly deficient averaging 50 percent or less of normal over the greater part of the drainage. The rivers from North Carolina southward which were in flood during April receded to low stages by the close of May.

Floods during May were confined to minor overflows in the Connecticut River and upper Susquehanna River Basin, and to overflows which continued from the previous month in the Altamaha River Basin.

Flood stage was exceeded slightly at South Newbury, Vt., on the Connecticut River on May 7–8, as a result of rapidly melting snow in the higher elevations of the upper tributary basin combined with moderate rains on May 7. Minor flooding occurred also in the Chenango and Chemung Rivers in New York from moderately heavy rains on May 6–7, and flood stage was exceeded in the Susquehanna River at Vestal, N. Y.

East Gulf of Mexico drainage.—Extensive flooding which occurred during April extended into the first part of May. Otherwise, precipitation during May was light and no important further rises occurred. Crest stages were reached mainly in April, and a summary of these floods were given in table 1.

Light to moderate floods occurred in the Conecuh and Choctawhatchee Rivers from moderately heavy rains during the period April 14–26. The average depths of rainfall for the individual storm periods were as follows (dates in April): 14th, 2.30 inches; 18th, 1.56 inches; 21st, 1.26 inches; 23d, 1.21 inches; and 26th, 1.67 inches.

Stages in the middle and lower Alabama River basin rose to moderately high flood as the result of frequent rains beginning April 9 and ending with excessive rains on the 26th, several stations reporting over 4 inches on the latter date. The Tallapoosa River at Milstead, Ala., reached a crest of 46.1 feet on April 27–28, the highest stage at that point since 1925.

Heavy rains over the Black Warrior-Tombigbee River Basin during the latter part of March were responsible for the highest stages since December 1926 in the upper Tombigbee River, and further rains in April resulted in one of the longest flood periods of record in the Tombigbee from Demopolis, Ala., southward. Heavy rains occurred in March on the 18–19th, 22–23d, and 26–29th. In the latter period, 8.27 inches was recorded at Tupelo, Miss., in the upper Tombigbee River Basin, and at three stations, Houston, Pontotoc, and Tupelo, Miss., the rainfall averaged 7.30 inches.

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The Black Warrior River crested at 62.0 feet at Tuscaloosa, Ala., on March 30 and the Tombigbee crested on the same date at Aberdeen, Miss., at 43.0 feet, the same as the record stage in December 1926. The rise in the Tombigbee continued until April 7 at Demopolis, Ala., when a crest of 61.2 feet was reached, and continued until April 12 in the lower reaches. From then until April 18 the stages fell steadily. Rains occurred on April 18 and again on the 26–27th causing another rise to set in. The rains in the latter period averaged 4.65 inches from Demopolis southward, and caused unprecedented rises in the lower river at still high stages. Demopolis crested at 52.9 feet on April 29, and at Lock No. 1, the crest stage of 41.8 feet on April 28 was the highest of the month.

Heavy rainfall again on May 4–5 produced a minor rise in the upper and middle Tombigbee and checked the fall in the lower reaches where the stages fell below flood stage by the middle of May. The persistent high water increased the flood losses greatly by halting lumber operations and delaying crop planting 4 to 6 weeks. Losses to crops and tangible property have been estimated at about $875,000.

The Pearl River remained above flood stage at Jackson, Miss., from March 20 to May 17, a total of 59 days, and at Pearl River, La., above flood stage prevailed from March 9 to May 20, a total of 73 days. The highest stages reached at Jackson and Pearl River were 34.0 feet on April 4 and 15.9 on April 2–3, respectively. These rises were the result of excessive rains during the latter part of March. Scattered heavy rains occurred again during April from the 18th to the 26th, over the Pearl and Pascagoula River basins. The average rainfall over the two basins during this period was about 9 inches, and the greatest amount reported at any station was 13.22 inches.

Heavy rains occurred again on May 4, but as the rivers were falling no important rises occurred. Light rainfall during the remainder of May allowed the stages to fall steadily. Flood losses in the Pearl and Pascagoula Rivers have been estimated at more than $100,000.

MISSISSIPPI SYSTEM

Widespread flooding occurred during May following extensive and excessive overflows in April. Record or near record floods centering in Iowa but extending to other sections of the upper Mississippi and lower Missouri Valleys resulted from excessive rains during May in a region where streams were generally above normal. Stages in the Skunk and Des Moines Rivers in Iowa, the St. Croix River in Wisconsin, and the Mississippi River from Keokuk, Iowa, to Louisiana, Mo., closely approached or exceeded the highest stages of record. A severe flash flood in the Elkhorn River in Nebraska caused heavy damage in Norfolk, Nebr., on May 11–12. This was followed, a month later, by another disastrous flood in the Elkhorn downstream from Norfolk.

The April flood crests of the Missouri and upper Mississippi Rivers moved downstream causing light flooding in the Mississippi River below the mouth of the Ohio and moderate flooding in the reach below the mouth of the Red River. A crest of 19.4 feet was reached at New Orleans, La., on May 21. The Ouachita and lower Red Rivers were in moderately high flood from heavy rains in May. A summary of flood crests in the Mississippi Valley during April and May 1944 and comparative readings for the period April–June 1943 and prior record stages are given in table 2.

Upper Mississippi Basin.—Records shown in table 3

indicate that the States, or sections of States, comprising the Mississippi River drainage above Grafton, Ill., have had predominantly above normal precipitation during May and June 1942 and 1943 and April and May of this year. This has resulted in floods at Grafton in each of these periods with crest stages as follows (flood stage 18 feet): 21.7 feet, June 29, 1942; 29.0 feet, May 24, 1943; 22.9 feet, June 21, 1943; 28.6 feet, April 30, 1944; and 21.9 feet, June 1, 1944. During May 1944, precipitation excesses were greatest in Iowa and Minnesota where the State averages of 6.13 and 5.20 inches, respectively, for the month were about 2 inches above normal.

High water was general throughout the drainage area during May 1944 and floods occurred in the Minnesota, St. Croix, Skunk, Iowa, Des Moines, and Mississippi Rivers. The floods were severe notably in central and southeastern Iowa where record or near record stages occurred in the Skunk and Des Moines Rivers and in the Mississippi River at Keokuk, Iowa. The St. Croix River reached the highest stage in 21 years of record at Rush City, Minn., according to the Geological Survey.

The Minnesota River overflowed lowlands for a distance of 160 miles above its mouth as the result of two general rises. The first was produced by general rains beginning April 30 and continuing for a week, the river reaching a crest of 20.0 feet at Mankato, Minn., on May 8. A second rainy period occurred between May 12 and 23 causing a crest of 20.4 feet at Mankato on May 23. The greatest loss was to prospective crops, estimated at $600,000.

The floods in central Iowa streams were caused mainly by intensive rainfall from May 18 to 23. Maximum amounts reported during this period were: Fort Dodge 6.07 inches, Ames 9.22 inches, and Marshalltown 7.37 inches, stations in the upper Des Moines, Skunk, and Iowa River basins, respectively. The greatest station total for the month was 14.65 inches at State Center and the greatest 24-hour amount was 5.74 inches at Ames on the 18–19th.

In the Des Moines River Basin, the Raccoon River crested at Van Meter, Iowa, at 18.3 feet on May 21, only 0.7 foot below the record high stage of September 1926, and the Des Moines River crested at Boone, Iowa, on May 22 at 24.85 feet compared to a high stage of 26.9 in May 1903. The crest passed Des Moines on May 23 at 24.5 feet, and Keosauqua, Iowa, in the lower reach on May 26. Broad crests were generally found in the lower reach of the river due to heavy rains in that area late in the period; Keosauqua reported 5¼ inches of rain in 24 hours ending the morning of the 24th.

The Skunk River reached the highest stages of record at Coppock and Augusta, Iowa, in the lower river, with crests of 22.3 and 23.0 feet on May 24 and 26, respectively.

Considerable flooding in the Iowa River occurred at Marshalltown, Iowa, on May 19 and moved slowly downstream, reaching Wapello, Iowa, on May 25. The crest at Wapello was 14.7 feet, 1.5 feet below the March 1929 flood.

The Meramec River in Missouri was in moderate flood on two occasions, May 3 to 6 and May 9 to 12.

The Mississippi River reached bankfull stage at Winona, Minn., on May 18. Below Dubuque, Iowa, light to moderate flooding extended to Keithsburg, Ill. From that point downstream the flow was augmented by the heavy discharge from the Iowa, Skunk, and Des Moines Rivers. The crests at Keokuk, Iowa, and Quincy, Ill., of 20.85 and 23.0 feet, respectively, exceeded the record flood of June 1851, and at Hannibal, Mo., the crest of 22.5 feet equalled the record flood of June 1903 at that point. The crests occurred almost simultaneously from Keithsburg to Hannibal, as follows: Keithsburg and Keokuk on the 27th–28th and at Quincy and Hannibal on the 28th.

Missouri Basin.—Floods occurred during May in the Floyd and Big Sioux Rivers in Iowa, the Kansas River and tributaries, the Elkhorn River in Nebraska, the Grand River in Missouri and portions of the lower Missouri. Crests were generally lower than the floods which occurred in April. Exceptions were the Floyd River, which crested at James, Iowa, at 19.2 feet on May 13, the highest stage in a short period of record, and the disastrous flash flood in the Elkhorn River.

The flood in the Floyd River was caused by heavy rainfall on May 10–11th, occurring on already well-saturated ground. At about the same time rains averaging 2 to 4 inches fell in the Elkhorn River basin north of Norfolk, Nebr. As the crest approached Norfolk, approximately 3 inches of rain occurred shortly before midnight of May 11th in that vicinity with the immediate effect of flooding streets and isolating the city. Property damage in Norfolk and vicinity was heavy.

Moderate overflows occurred during the first ten days of the month in the Smoky Hill, Solomon, Republican, Kansas, Delaware, and Grand Rivers. The floods were generally of short duration and only moderate damage occurred.

The Missouri River reached a crest of 23.5 feet at Kansas City, Mo., compared to a crest of 27.6 feet on April 27. Little or no overflow occurred below Kansas City from this rise. The lower Missouri River at and below Boonville, Mo., receded from the extremely high flood of April, passing below flood stage at the mouth by May 13.

Ohio Basin.—Except for flood stages which continued from the April flood in the lower Ohio River, only a few scattered floods occurred during May. Light flooding resulted at a few points along the Wabash River from heavy rains on May 8–9 in the upper Wabash basin. Local flooding in Little Mill Creek, in the Little Kanawha River basin, on May 17, resulted in the highest stage known at Marshall, W. Va.

White and Arkansas Basins.—Stages were high in the White and Arkansas River basins from last month's floods, and rises occurred again in May, resulting mostly in light to moderate overflows.

The White River crested at 30.6 feet at St. Charles, Ark., on May 11–12, exceeding the April crest by 4.5 feet. In the Arkansas River, flood stages were exceeded at most points from Great Bend, Kans., downstream. The flooding was mostly light and in the reach from Arkansas City to Wichita, Kans., was well below the high flood of April. Light to moderate overflows also occurred in Arkansas River tributaries including the Little Arkansas, and upper Neosho River in Kansas, the Verdigris, North Caandian and Poteau Rivers in Oklahoma, and the Petit Jean River in Arkansas.

Red Basin.—Rains were heavy over the middle and lower Red River Basin late in April and early in May. Flooding was confined largely to the Ouachita in Arkansas and Louisiana, the Little, Sulphur and Cypress in Arkansas and Texas and the lower Red River in Arkansas and Louisiana.

The Ouachita River exceeded flood stage by 9 feet at Arkadelphia, Ark., on May 2 and by 16 feet at Camden, Ark., on May 5. The crest at Camden, 42 feet, was the highest stage measured at the present gage site. High stages occurred in the Little, Sulphur and Cypress River but record stages were not reached. No water was released from Denison Dam during the flood period and overflows

in the Red River were mostly light except in the extreme lower portion. A stage of 38.5 feet, 6.5 feet above flood stage, was reached at Alexandria, La., on May 14.

Lower Mississippi Basin.—The excessive floods in the lower Missouri and upper Mississippi Rivers during April, converged in the Mississippi River to produce a crest of 39.1 feet at St. Louis, Mo., on April 30, exceeding the flood of May 1943 by 0.3 foot and 2.3 feet below the record flood of June 1844. The crest passed Cape Girardeau, Mo., on May 6 at 40.8 feet, 1.6 feet below the May 1943 flood. There was considerable similarity between the 1943 and 1944 floods in this reach of the river as shown in table 2.

The lower Ohio River was falling rapidly with the approach of the crest from the upper Mississippi, and Cairo, Ill., crested on April 29 at 51.2 feet, compared to a stage of 53.0 in May 1943. From Memphis, Tenn., to the mouth of the Red River, stages in the Mississippi exceeded flood only slightly and were generally slightly below the stages of the 1943 flood. However, below the mouth of the Red River, stages were higher than in 1943. The river crested at Baton Rouge, La., between May 17–23 at a stage of 41.3 feet compared to 38.8 feet in 1943, and at New Orleans, La., on May 21 at 19.4 feet, 1.2 feet higher than last year.

West Gulf of Mexico drainage.—Excessive precipitation during May in eastern Texas produced flooding in the Sabine, Neches, Trinity, Brazos, Guadalupe, and Nueces Rivers. Near record stages were reached in the Sabine River and exceeded in the Neches River at Rockland, Tex. The crest at Rockland was 31.8 feet on May 7, compared to the previous high of 28.9 feet in April 1922.

The rainfall occurred in two general periods, the first 5 days of the month and the last decade. The rainfall was generally more intense in the first period and generally caused the excessive flooding. The rains in the second period served largely to prolong the floods. At Bronson, Tex., in the Neches River Basin, the precipitation for the month totaled 21.16 inches. Several stations in east Texas had over 15 inches and precipitation for the eastern third of the State averaged 10.38 inches, or 5.87 inches above the normal.

The greatest flood losses were to prospective crops amounting to millions of dollars.

As a result of melting snow in the mountainous sections of south central Colorado, in the upper Rio Grande Basin, flood stage was reached and exceeded at Lobatos Bridge, Colo., and Embudo and Espanola, N. Mex. Flood stage was reached on May 11 and continued at the end of the month at these stations.

Colorado River Basin.—Rapidly melting snow in the Gunnison River basin produced a sudden rise in the lower Gunnison River and tributaries cresting at Delta, Colo., at 12.8 feet on May 17. This exceeded the previous highest stage of record, 12.7 feet in May 1941.

TABLE 1.—*Flood stages in East Gulf of Mexico drainage, April–May 1944* [1]

River and Station	Flood stage	Dates above flood stage		Crest		Maximum stage previously known	
		From—	To—	Stage	Date	Stage	Date
Chattahoochee:							
Columbus, Ga	34	Apr. 28	Apr. 28	34.6	Apr. 28	53.2	Mar. 15, 1929
Eufaula, Ala	40	Mar. 30	Apr. 1	44.8	Mar. 31	63.8	Mar. 17, 1929
		Apr. 27	Apr. 30	48.9	Apr. 29		
Columbia, Ala	42	Mar. 31	Apr. 1	43.1	Apr. 1	56.0	Mar. 18, 1929
		Apr. 28	Apr. 30	45.5	Apr. 29		
Flint:							
Montezuma, Ga	20	Mar. 31	Apr. 2	21.2	Apr. 1	27.4	Mar. 17, 1929

[1] Including dates in March when flooding continued into April.

TABLE 1.—*Flood stages in East Gulf of Mexico drainage, April–May 1944* [1]—Continued

River and Station	Flood stage	Dates above flood stage		Crest		Maximum stage previously known	
		From—	To—	Stage	Date	Stage	Date
Flint—Continued.							
Albany, Ga	20	Mar. 23	Apr. 6	31.3	Mar. 26	36.6	Jan. 21, 1925
				28.4	Apr. 3		
		Apr. 16	Apr. 22	26.5	Apr. 17		
		Apr. 27	May 4	6.9	Apr. 29		
Bainbridge, Ga	25	Mar. 25	Apr. 8	32.9	Apr. 30	40.9	Jan. 22, 1925
		Apr. 18	Apr. 26	28.9	Apr. 22		
		Apr. 29	May 6	29.5	May 2		
Apalachicola:							
Chattahoochee, Fla	20	Mar. 25	Apr. 7	24.8	Mar. 28	35.0	Mar. 20, 1929
				25.6	Apr. 2–3		
		Apr. 20	May 4	21.5	Apr. 22		
				25.0	May 1		
Blountstown, Fla	15	Mar. 20	May 17	23.1	Mar. 29	28.6	Mar. 21, 1929
				23.6	Apr. 3		
				21.8	Apr. 23–25		
				23.1	May 2		
Choctawhatchee:							
Newton, Ala	19	Apr. 16	Apr. 17	23.0	Apr. 17	39.4	Mar. 15, 1929
Geneva, Ala	23	Apr. 23	Apr. 24	23.3	Apr. 23	46.9	Mar. 16, 1929
Caryville, Fla	12	Mar. 23	Apr. 6	13.6	Mar. 28	27.1	Mar. 17, 1929
				13.1	Apr. 3		
		Apr. 18	May 3	13.3	Apr. 21, 25		
Conecuh:							
River Falls, Ala	35	Mar. 31	Apr. 1	36.0	Mar. 31	50.5	Mar. 15, 1929
		Apr. 28	Apr. 30	39.0	Apr. 29		
Brewton, Ala	17	Mar. 24	Apr. 5	19.8	Mar. 28	33.3	Do.
				18.9	Apr. 3		
		Apr. 27	Apr. 28	17.0	Apr. 27–28		
		Apr. 29	May 3	18.7	May 1		
Oostanaula:							
Resaca, Ga	22	Mar. 29	Apr. 3	28.7	Mar. 31	36.6	Apr. 1, 1886
Rome, Ga	25	do	Apr. 2	29.0	Mar. 30–31	40.3	Do.
Coosa:							
Mayos Bar Lock, Ga	28	do	Apr. 3	32.9	Mar. 31	37.0	Dec. 30, 1932
Gadsden, Ala	20	Mar. 28	Apr. 7	25.25	do	36.7	Apr. 6, 1886
Lock No. 4, Lincoln, Ala.	17	do	Apr. 5	20.8	Mar. 30	24.5	Apr. 9, 1938
Childersburg, Ala	20	Mar. 29	Apr. 1	22.3	do	30.0	Do.
Wetumpka, Ala	45	Apr. 28	Apr. 29	45.5	Apr. 29	61.7	Apr. 1, 1886
Tallapoosa: Milstead, Ala.	40	Apr. 27	Apr. 28	46.1	Apr. 28	54.0	Dec. 10, 1919
Cahaba:							
Centerville, Ala	23	Apr. 12	Apr. 12	25.4	Apr. 12	37.8	July 8, 1916
		Apr. 27	Apr. 27	25.0	Apr. 27		
Marion Junction, Ala	36	Mar. 31	Apr. 2	37.5	Apr. 1	42.9	Aug. 16, 1939
Alabama:							
Montgomery, Ala	35	Mar. 29	Apr. 4	45.8	do	59.7	Apr. 1, 1886
		Apr. 27	May 2	48.3	Apr. 29		
Selma, Ala	45	Mar. 30	Apr. 5	49.3	Apr. 2	57.0	Apr. 8, 1886
		Apr. 27	May 3	50.5	Apr. 30		
Millers Ferry, Ala	40	Mar. 24	Apr. 10	51.3	Apr. 3	56.8	Mar. —, 1929
		Apr. 21	May 6	52.0	May 2		
Black Warrior:							
Lock No. 10, Tuscaloosa, Ala.	47	Mar. 28	Apr. 2	62.0	Mar. 30	68.6	Apr. 18, 1900
		Apr. 13	Apr. 13	47.3	Apr. 13		
Lock No. 7, Eutaw, Ala.	35	Mar. 28	Apr. 10	53.2	Apr. 2	....	
		Apr. 12	Apr. 18	42.2	Apr. 15		
		Apr. 25	May 2	41.3	Apr. 29		
Tombigbee:							
Aberdeen, Miss	34	Mar. 28	Apr. 4	43.0	Mar. 30	44.8	Apr. 20, 1892
Columbus, Miss	29	Mar. 29	Apr. 5	37.6	Apr. 1	.....	Dec. 28, 1926
Gainesville, Ala	36	do	Apr. 16	50.6	May 5	47.1	Apr. 10, 1938
Lock No. 4, Demopolis, Ala.	39	Mar. 22	May 12	61.2	Apr. 7	73.1	Apr. 22, 1900
				52.9	Apr. 29		
Lock No. 3, Ala	33	Mar. 21	May 15	59.3	Apr. 8–9	66.1	Apr. —, 1900
				56.1	Apr. 28		
Lock No. 2, Ala	46	Mar. 23	May 13	60.7	Apr. 9	65.9	Apr. —, 1874
				58.4	Apr. 28		
Lock No. 1, Ala	31	do	May 16	41.5	Apr. 12	51.8	May —, 1874
				40.0	Apr. 22		
				41.8	Apr. 28		
Chickasawhay:							
Enterprise, Miss	20	Mar. 30	Apr. 1	23.7	Mar. 31	37.2	Apr. —, 1900
		Apr. 20	Apr. 21	21.7	Apr. 21		
		Apr. 25	Apr. 30	26.3	Apr. 28		
Shubuta, Miss	30	Apr. 3	Apr. 3	30.2	Apr. 3	47.9	Apr. —, 1900
		Apr. 23	May 3	37.4	Apr. 30		
Waynesboro, Miss	35	Apr. 26	May 2	38.2	Apr. 27	48.4	Apr. 10, 1938
Pascagoula: Merrill, Miss.	22	Mar. 24	Apr. 7	24.4	Apr. 1–2	32.5	Apr. —, 1900
		Apr. 27	May 8	25.3	May 1		
Bogue Chitto: Franklinton, La.	11	Mar. 29	Apr. 1	13.7	Mar. 30	18.3	Mar. 22, 1943
Pearl:							
Edinburg, Miss	20	Mar. 28	Apr. 4	25.9	Mar. 31	29.0	Mar. 1, 1902
		Apr. 27	May 1	22.1	Apr. 29		
Jackson, Miss	18	Mar. 20	May 17	34.0	Apr. 4	37.2	Apr. 1, 1902
				27.3	Apr. 30		
				27.4	May 5		
Monticello, Miss	15	Mar. 22	Apr. 17	18.2	Mar. 24	31.0	Apr. —, 1902
				22.6	Apr. 1		
				23.6	Apr. 8		
		Apr. 21	May 13	19.7	Apr. 25, 29		
				18.6	May 7		
Columbia, Miss	17	Mar. 24	Apr. 18	18.6	Mar. 25	....	—, 1874
				22.3	Apr. 5		
				22.8	Apr. 10		
		Apr. 24	May 12	19.6	Apr. 28		
				18.4	May 7–8		
Pearl River, La	12	Mar. 16	May 30	15.9	Apr. 2–3	20.2	—, 1874
				15.6	Apr. 5–17		
				15.5	May 8		

TABLE 2.—*Summary of provisional stages in Mississippi Valley floods of April–May 1944*

River and station	Flood stage	Maximum during floods of April–May 1944				Maximum during floods of April–June 1943		Maximum flood previously known	
		April		May					
		Stage	Date	Stage	Date	Stage	Date	Stage	Date
Upper Mississippi									
Iowa: Wapello, Iowa	10			14.7	25	8.1	June 22	16.2	March 1929.
Skunk: Augusta, Iowa	15	19.6	24	23.0	26	16.4	May 20	22.55	June 1930.
Raccoon: Van Meter, Iowa	13			18.3	21	12.7	June 16	19.0	September 1926.
Des Moines:									
Boone, Iowa	20			24.85	22	12.1	June 30	26.9	May 1903.
Des Moines, Iowa	23			24.5	23	16.8	do	[1] 22.6	Do.
Tracy, Iowa	14	16.0	24	21.55	23	15.7	May 17	25.0	Do.
Eddyville, Iowa	15	19.2	24	22.8	24	19.0	do	24.8	Do.
Ottumwa, Iowa	9	11.3	24	17.6	24	10.65	do	[2] 16.5	June 1917.
Keosauqua, Iowa	20			18.5	26	11.7	do		June 1903.
Fox: Wayland, Mo	15	18.5	24			15.3	May 18	21.5	June 1933.
Salt: New London, Mo	19	26.5	25			27.2	May 19	28.8	June 1928.
Illinois:									
Morris, Ill	13	18.3	24			21.6	May 21	26.85	——, 1866.
Peru, Ill	17	23.2	25			27.7	May 22	27.0	June 1916.
Peoria, Ill	18	23.6	27			28.6	May 23	26.3	June 1844.
Havana, Ill	14	23.3	29			27.3	May 25	23.5	October 1926.
Beardstown, Ill	14	26.2	29–30			29.7	May 26–27	26.25	do
Meramec:									
Pacific, Mo	11	13.4	25	14.8	4, 12	22.0	May 21		
Valley Park, Mo	14	18.2	25	18.7	4	26.2	May 22	37.85	August 1915.
Mississippi:									
Keokuk, Iowa	12	15.1	24–25	20.85	27–28	14.5	June 18	21.0	June 1851.
Quincy, Ill	14	19.1	25	23.0	28	17.4	do	22.1	Do.
Hannibal, Mo	13	19.6	25	22.5	28	17.7	do	22.5	June 1903.
Louisiana, Mo	12	19.2	26	19.8	28	17.6	May 21	21.1	April 1929.
Grafton, Ill	18	28.6	30	21.9	June 1	29.0	May 24	32.1	June 1844.
St. Louis, Mo	30	39.1	30			38.9	do	41.4	Do.
Chester, Ill	27	29.7	17–18	37.3	2–3	38.0	May 25	39.9	Do.
Cape Girardeau, Mo	32	34.8	18	40.8	6	42.4	May 27	42.5	July 1844.
Missouri Basin									
Kansas:									
Manhattan, Kans	17	20.7	23	21.1	3	23.0	June 16–17		
Wamego, Kans	16	17.0	23	16.9	4	20.9	June 17	26.3 23.8	May 1903. June 1935.
Topeka, Kans	21	25.4	23	23.9	3	26.8	do	42.2 28.0	June 1844. June 1908.
LeCompton, Kans	17	22.0	24	20.4	4	22.7	do	29.5	May 1903.
Lawrence, Kans	18	23.3	23	21.0	4				
Delaware: Valley Falls, Kans	22	25.1	23	26.8	3				
Thompson Fork: Trenton, Mo	20	20.9	23			18.9	May 16	30.3	July 1909.
Grand:									
Gallatin, Mo	20	31.5	24	26.1	5	27.0	June 12	39.25	Do.
Chillicothe, Mo	18	31.3	23	28.85	5	29.2	June 17	33.65	Do.
Brunswick, Mo	12	23.8	26	19.2	7	23.3	June 20	23.0	Do.
Osage:									
Quenemo, Kans	27	38.1	23			35.0	June 11	38.4	November 1928.
Ottawa, Kans	24	36.5	23			27.5	June 18	37.6	November 1928.
LaCygne, Kans	25	31.9	24			30.1	May 21	30.8	June 1925.
Trading Post, Kans	24	30.8	25			27.8	May 19	34.45	November 1928.
Osceola, Mo	20	22.4	13	31.6	1	41.5	May 21	45.3	June 1844.
Lakeside, Mo	60			61.4	3	65.4	May 22	62.3	October 1941.
St. Thomas, Mo	23	25.9	29	29.0	4	43.8	May 20	34.5	Do.
Missouri:									
Mobridge, S. Dak	16	16.6	5			18.95	Apr. 5		
Pierre, S. Dak	15	15.6	9			19.6	Apr. 6	23.0 17.9	March 1881. April 1899.
Blair, Nebr	18	21.0	13			21.4	Apr. 12	19.4	April 1939.
Omaha, Nebr	19	19.4	16			22.4	Apr. 13	23.8	April 1881.
Nebraska City, Nebr	15	19.6	17–18			19.9	Apr. 14	18.0	Do.
St. Joseph, Mo	17	18.5	21			18.5	June 18	27.2	Do.
Kansas City, Mo	22	27.6	24–25	23.5	4	29.1	June 18–19	38.0	June 1844.
Lexington, Mo	22	27.7	24	23.7	5	28.4	June 19		
Waverly, Mo	18	24.3	24	20.9	6	24.35	June 18	22.0	June 1935.
Boonville, Mo	21	30.9	27			28.8	June 22	32.7	June 1844.
Hermann, Mo	21	30.8	28			31.1	May 21	29.5	June 1903.
St. Charles, Mo	25	36.5	29			36.6	May 22	40.1	June 1844.
Ohio Basin									
West Fork of White:									
Anderson, Ind	10	17.4	12			19.0	May 18	22.9	March 1913.
Noblesville, Ind	14	17.6	13			20.1	May 19	23.8	Do.
Indianapolis, Ind	18					17.0	May 18	29.5	Do.
Elliston, Ind	18	27.7	14			30.0	May 21	31.3	Do.
Edwardsport, Ind	12	24.0	15			25.0	May 22	20.8	January 1937.
East Fork of White:									
Seymour, Ind	14	18.2	12			16.0	May 21	22.5	March 1913.
Williams, Ind	10	17.0	15			7.2	May 23	25.0	January 1937.
Shoals, Ind	25	27.8				15.8	May 17	42.2	March 1913.
White:									
Petersburg, Ind	16	23.8	15–17			24.3	May 22–23	28.1	January 1937.
Hazleton, Ind	16	25.9	18			26.4	May 23	31.6	Do.
Wabash:									
Bluffton, Ind	10	13.8	13			14.8	May 19	20.0	March 1913.
Wabash, Ind	12	20.8	11	12.9	10	24.8	May 18		
Logansport, Ind	17	15.9	12			21.4	May 19	25.3	Do.
La Fayette, Ind	11	22.8	13	15.2	10	28.4	do	32.9	Do.
Covington, Ind	16	26.3	14	17.8	12	32.4	May 20	35.1	Do.
Terre Haute, Ind	14	21.6	16	14.4	13–14	30.5	do	31.3	Do.
Vincennes, Ind	14	20.5	20			27.0	May 22	25.2	January 1930.
Mt. Carmel, Ill	17	24.2	20			27.5	May 25	31.0	March 1913.
New Harmony, Ind	15	19.7	20			23.8	May 26	24.4	January 1937.
Ohio:									
Paducah, Ky	39	41.2	4			48.6 40.7	March 29 May 30	60.6	February 1937.
Dam No. 53, near Mound City, Ill	42	50.5	26–28			52.1	do	64.0	Do.
Cairo, Ill	40	51.2	29			53.0	do	59.5	Do.

See footnotes at end of table.

TABLE 2.—*Summary of provisional stages in Mississippi Valley floods of April–May 1944*—Continued

River and station	Flood stage	Maximum during floods of April–May 1944				Maximum during floods of April–June 1943		Maximum flood previously known	
		April		May					
		Stage	Date	Stage	Date	Stage	Date	Stage	Date
Arkansas Basin									
Verdigris:									
Independence, Kans	36	43.7	24			47.6	May 20	[1] 46.0	October 1927.
Claremore, Okla	32	47.4	13	40.8	5	55.0	May 21	46.6	November 1941.
Cottonwood:									
Cottonwood Falls, Kans	9	16.0	23					12.5	October 1941.
Emporia, Kans	20	27.7	23	22.2	6	15.9	June 10	27.1	July 1904.
Neosho:									
Neosho Rapids, Kans	22	28.2	23	23.5	4–5	25.1	June 18	29.5	Do.
Burlington, Kans	23	35.0	24	25.7	6	27.2	June 19	34.4	November 1928.
Iola, Kans	15	22.65	25			20.7	May 19	24.0	July 1904.
Chanute, Kans	20	26.9	26			28.9	May 19	29.6	September 1926.
Parsons, Kans	22	29.7	27			29.25	May 20	27.5	November 1928.
Oswego, Kans	17	25.9	28			25.8	May 21	25.4	April 1927.
Arkansas:									
Wichita, Kans	9	12.0	23	9.4	4	3.9	June 11	13.5	June 1923.
Arkansas City, Kans	16	25.2	24	17.4	2	15.2	May 19	25.5	Do.
Ralston, Okla	16	23.5	25			18.4	May 21	23.2	Do.
Tulsa, Okla	12	17.0	26			16.7	May 20	19.8	Do.
Webbers Falls, Okla	23	25.8	27	25.9	3	30.0	May 22	38.2	June 1833.
Fort Smith, Ark	22	24.0	28	26.8	3	41.7	May 12	38.0	Do.
Van Buren, Ark	22	24.7	13	26.8	4	38.0	May 12	35.8	November 1941.
Dardanelle, Ark	22	23.4	14	26.3	4–5	34.0	May 25	33.0	April 1927.
Red Basin									
Ouachita:									
Arkadelphia, Ark	17	25.6	24	25.8	2	18.5	Apr. 19	29.2	Do.
Camden, Ark	26	33.1	28	42.0	5	31.4	Apr. 23	41.5	January 1937.
Monroe, La	40	40.2	17–19	45.5	18–19	30.4	Apr. 10	49.7	February 1932.
Lower Mississippi Basin									
Mississippi:									
New Madrid, Mo	34	40.4	30			41.3	May 31	47.9	February 1937.
Memphis, Tenn	34			37.1	5	37.8	June 4	48.7	Do.
Baton Rouge, La	35			41.3	17–23	38.8	June 14–15	47.8	May 1927.
New Orleans, La	17			19.4	21	18.2	June 12	21.3	April 1922.

[1] Based on gage and datum then in use.
[2] At site of gage then in use; higher stage occurred.

TABLE 3.—*Precipitation and departures from normal in upper Mississippi Basin for period of flooding at Grafton, Ill., 1942–44*

State	Section of State	1944				1943				1942			
		April		May		May		June		May		June	
		Average precipitation	Departure from normal	Average precipitation	Departure from normal	Average precipitation	Departure from normal	Average precipitation	Departure from normal	Average precipitation	Departure from normal	Average precipitation	Departure from normal
Minnesota	Southwest	2.40	+0.11			4.23	+0.93	6.46	+2.29	7.07	+3.79	3.68	−0.45
				[1] 5.20	[1] +1.95								
Do	Southeast	2.74	+0.51			5.14	+1.54	5.32	+.99	6.05	+2.48	4.15	−.17
Wisconsin	All	2.41	−0.09	3.65	−.01	4.50	+.84	5.75	+1.64	6.36	+2.72	4.66	+.58
Iowa	North central	3.10	+0.68			3.56	−.89	5.53	+1.04	5.30	+.81	5.24	+.74
Do	Northeast	2.72	+0.24			3.44	−.88	4.69	+.39	4.71	+.39	7.37	+3.15
Do	Central	4.34	+1.65			4.53	+.26	5.94	+1.36	5.18	+.89	6.60	+2.02
				[1] 6.13	[1] +2.06								
Do	East central	4.74	+1.98			4.42	+.33	4.57	+.25	3.67	−.40	5.48	+1.16
Do	South central	6.10	+3.20			5.28	+1.15	7.49	+2.72	4.35	+.22	6.12	+1.35
Do	Southeast	6.74	+3.72			5.94	+1.90	4.95	+.15	3.35	−.69	5.29	+.49
Illinois	North	4.73	+1.70	4.35	+.40	6.22	+2.27	3.16	−.81	3.97	+.07	3.97	−.02
Do	Central	7.75	+4.10	4.13	−.05	10.31	+6.12	3.77	−.18	4.38	+.31	6.03	+1.77

[1] Entire State.

FLOOD-STAGE REPORT FOR MAY 1944

[All dates in May unless otherwise specified]

River and station	Flood stage	Above flood stages—dates		Crest [1]	
		From—	To—	Stage	Date
ST. LAWRENCE DRAINAGE					
Lake Erie					
	Feet			*Feet*	
St. Joseph: Montpelier, Ohio	10			10.8	27
ATLANTIC SLOPE DRAINAGE					
Connecticut: South Newbury, Vt	22	6	8	22.3	7
Chenango: Greene, N. Y	8	8	8	8.3	8
Chemung: Chemung, N. Y	12	8	8	14.4	8
Susquehanna: Vestal, N. Y	14	8	8	15.6	8
James: Columbia, Va	10	7	10	13.5	8
Pee Dee:					
Cheraw, S. C	30	Apr. 13	Apr. 14	36.85	Apr. 13
Mars Bluff Bridge, S. C	17	Apr. 14	2	20.8 18.1	Apr. 19 Apr. 30
Saluda:					
Pelzer, S. C	6	Apr. 12 Apr. 15 Apr. 28	Apr. 14 Apr. 17 Apr. 28	6.8 6.5 6.0	Apr. 13 Apr. 16 Apr. 28
Chappells, S. C	13	Apr. 15	Apr. 16	13.6	Apr. 16
Broad: Blairs, S. C	14	Mar. 30 Apr. 12 Apr. 28	Mar. 31 Apr. 13 Apr. 28	19.0 17.1 14.5	Mar. 31 Apr. 13 Apr. 28
Ogeechee: Dover, Ga	7	Apr. 20	8	7.8	Apr. 26
Ocmulgee					
Abbeville, Ga	11	Apr. 15	8	13.3 14.0 13.6	Apr. 17 Apr. 29 4
Lumber City, Ga	15			16.8	1
Oconee: Mount Vernon, Ga	16	3	5	16.2	4
Altamaha:					
Charlotte, Ga	12	Feb. 25	14	24.8 19.2	Mar. 31 Apr. 30
Piney Bluff, Ga	17	Apr. 17	11	19.1 19.9	Apr. 21-22
EAST GULF OF MEXICO DRAINAGE					
Choctawhatchee: Caryville, Fla	12	Apr. 18	3	13.3	Apr. 21, 25
Conecuh:					
River Falls, Ala	35	Apr. 28	Apr. 30	39.0	Apr. 29
Brewton, Ala	17	Apr. 29	3	18.7	1
Oostanaula:					
Resaca, Ga	22	Mar. 29	Apr. 3	28.7	Mar. 31
Rome, Ga	25	Mar. 29	Apr. 2	29.0	Mar. 30-31
Coosa:					
Mayos Bar Lock, Ga	28	Mar. 29	Apr. 3	32.9	Mar. 31
Lock No. 4, Lincoln, Ala	17	Mar. 28	Apr. 5	20.8	Mar. 30
Childersburg, Ala	20	Mar. 29	Apr. 1	22.3	Mar. 30
Wetumpka, Ala	45	Apr. 28	Apr. 29	45.5	Apr. 29
Cahaba:					
Centerville, Ala	23	Mar. 28 Apr. 12 Apr. 27	Mar. 31 Apr. 12 Apr. 27	28.05 25.4 25.0	Mar. 29 Apr. 12 Apr. 27
Marion Junction, Ala	36	Mar. 31	Apr. 2	37.5	Apr. 1
Alabama:					
Montgomery, Ala	35	Mar. 24 Mar. 29 Apr. 27	Mar. 27 Apr. 4 2	39.6 45.8 48.3	Mar. 25 Apr. 1 Apr. 29
Selma, Ala	45	Mar. 30 Apr. 27	Apr. 5 3	49.3 50.5	Apr. 2 Apr. 30
Millers Ferry, Ala	40	Mar. 24 Apr. 21	Apr. 10 6	51.3 52.0	Apr. 3 2
Black Warrior:					
Lock No. 10, Tuscaloosa, Ala	47	Apr. 13	Apr. 13	47.3	Apr. 13
Lock No. 7, Eutaw, Ala	35	Apr. 25	May 2	41.3	Apr. 29
Tombigbee:					
Lock No. 3, Ala	33	Mar. 21	15	59.3 56.1	Apr. 8-9 Apr. 28
Lock No. 2, Ala	46	Mar. 23	13	60.7 58.4	Apr. 9 Apr. 28
Chickasawhay:					
Shubuta, Miss	30	Apr. 23	3	37.4	Apr. 30
Waynesboro, Miss	35	Apr. 26	2	38.2	Apr. 27
Pascagoula: Merrill, Miss	22	Apr. 27	8	25.3	1
Pearl:					
Jackson, Miss	18	Mar. 20	17	34.0 27.3 27.4	Apr. 4 Apr. 30 5
Monticello, Miss	15	Apr. 21	13	19.7 18.6	Apr. 25, 29 7
Columbia, Miss	17	Apr. 24	12	19.6 18.4	Apr. 28 7-8
Pearl River, La	12	Mar. 8 Mar. 16	Mar. 16 May 30	12.9 15.9 15.6 15.5	Mar. 15 Apr 2-3 Apr. 5-17 8
MISSISSIPPI SYSTEM					
Upper Mississippi Basin					
Minnesota: Mankato, Minn	19	6 20	10 27	20.0 20.3	8 23-24
Iowa:					
Iowa City, Iowa	16	23	25	18.0	24
Wapello, Iowa	10	22	June 1	14.7	25
Skunk: Augusta, Iowa	15	24	June 1	23.0	26
Raccoon: Van Meter, Iowa	13	20	28	18.3	21
Boone: Webster City, Iowa	10	19	23	11.2	22

See footnotes at end of table.

FLOOD-STAGE REPORT FOR MAY 1944—Continued

River and station	Flood stage	Above flood stages—dates		Crest [1]	
		From—	To—	Stage	Date
MISSISSIPPI SYSTEM—continued					
Upper Mississippi Basin—Continued					
Des Moines:	*Feet*			*Feet*	
Boone, Iowa	20	Mar. 20	25	24.85	22
Des Moines, Iowa	23	22	26	24.5	23
Tracy, Iowa	14	21	June 2	21.6	23
Eddyville, Iowa	15	20	June 2	22.8	24
Ottumwa, Iowa	9	21	June 3	17.6	24
Illinois:					
Peoria, Ill	18	Apr. 15	14	20.0 23.6	Apr. 16 Apr. 27
Havana, Ill	14	Apr. 11	31	23.3	Apr. 29
Beardstown, Ill	14	Apr. 11	June 6	26.2	Apr. 29-30
Bourbeuse: Union, Mo	12	11	11	12.3	11
Meramec:					
Sullivan, Mo	11	3	4	14.8	4
Pacific, Mo	11	3 9	5 12	14.8 14.8	4 12
Valley Park, Mo	14	Apr. 28 9	6 12	15.1 18.7 16.2	Apr. 29 4 10
Mississippi:					
Winona, Minn	13	18	18	13.0	18
Gordons Ferry, Iowa	13	15	(2)	15.5	25
Clinton, Iowa	16	24	28	16.2	25-27
Muscatine, Iowa	15	22	June 1	17.0	27
Keithsburg, Ill	12	22	June 3	14.9	27-28
Keokuk, Iowa	12	21	June 6	20.85	27-28
Quincy, Ill	14	5 21	10 June 9	14.4 23.0	9 28
Hannibal, Mo	13	Apr. 21	(2)	19.6 22.5	Apr. 25 28
Louisiana, Mo	12	Apr. 21	(2)	19.2 13.2 19.8	Apr. 26 6, 10 28
Grafton, Ill	18	Apr. 22 26	15 (2)	28.6 21.9	Apr. 30 June 1
St. Louis, Mo	30	Apr. 23	13	33.1	Apr. 30
Chester, Ill	27	Apr. 14	16	29.7 37.3	Apr. 17-18 2-3
Cape Girardeau, Mo	32	Apr. 14	17	34.8 40.8	Apr. 18 6
Missouri Basin					
Big Sioux: Akron, Iowa	12	12	15	14.2	12
Floyd:					
Merrill, Iowa	13	13	13	14.2	13
James, Iowa	14	12	16	19.2	13
Elkhorn:					
Norfolk, Nebr	10	13	13	11.8	13
West Point, Nebr	12	14	16	13.8	14
Solomon:					
Beloit, Kans	18	2	6	28.9	4
Minneapolis, Kans	26	7	7	27.1	7
Niles, Kans	24	3	9	27.7	9
Saline: Tescott, Kans	25	6	7	26.7	7
Smoky Hill:					
Lindsborg, Kans	21	4		25.4	6
Salina, Kans	20	7	8	22.05	8
Enterprise, Kans	26	6	11	27.7	10
Republican:					
Concordia, Kans	8	3	3	8.1	3
Clay Center, Kans	15	1	4	17.0	2
Delaware: Valley Falls, Kans	22	3	4	26.8	3
Kansas:					
Ogden, Kans	18	3	4	18.7	3
Manhattan, Kans	17	3	5	21.1	3
Wamego, Kans	16	3	4	17.2	4
Topeka, Kans	21	3	4	23.9	3
LeCompton, Kans	17	3	5	20.4	4
Lawrence, Kans	18	3	5	21.0	4
Grand:					
Gallatin, Mo	20	3	5	26.1	5
Chillicothe, Mo	18	2	7	28.85	5
Brunswick, Mo	12	Apr. 11	11	23.8 19.2	Apr. 26 7
Osage: Osceola, Mo	20	Apr. 27	8	31.6	1
Missouri:					
Kansas City, Mo	22	4	6	23.5	4
Lexington, Mo	22	4	6	23.7	5
Waverly, Mo	18	4	8	20.9	6
Ohio Basin					
Wabash:					
Wabash, Ind	12	10	10	12.9	10
La Fayette, Ind	11	10	12	15.2	10
Covington, Ind	16	11	13	17.8	12
Terre Haute, Ind	14	12	14	14.4	13-14
Ohio:					
Dam No. 53, nr. Mound City, Ill.	42	Apr. 14	16	50.5	Apr. 26-28
Cairo, Ill	40	Mar. 21 Apr. 13	Apr. 10 18	45.6 51.2	Apr. 5 Apr. 29
White Basin					
White:					
Des Arc, Ark	24	Apr. 26 5	1 12	24.6 24.8	Apr. 28 7-8
St. Charles, Ark	25	Mar. 26	26	26.1 30.6	Apr. 4 11-12

FLOOD-STAGE REPORT FOR MAY 1944—Continued

River and station	Flood stage	Above flood stages—dates From—	Above flood stages—dates To—	Crest [1] Stage	Crest [1] Date
MISSISSIPPI SYSTEM—continued					
Arkansas Basin					
	Feet			*Feet*	
Little Arkansas: Sedgwick, Kans.	18	Mar. 2	5	23.2	3
Verdigris: Claremore, Okla.	32	Apr. 25	6	40.8	5
Cottonwood: Emporia, Kans.	20	5	6	22.2	6
Neosho:					
Neosho Rapids, Kans.	22	4	5	23.5	4-5
Burlington, Kans.	23	Apr. 22	2	35.0	Apr. 24
		5	7	25.7	6
Iola, Kans.	15	Apr. 22	3	22.65	Apr. 25
Chanute, Kans.	20	Apr. 23	----	26.9	Apr. 26
Parsons, Kans.	22	Apr. 24	----	29.7	Apr. 27
Oswego, Kans.	17	Apr. 23	7	25.9	Apr. 28
North Canadian: Yukon, Okla.	11	1	1	11.9	1
Poteau: Poteau, Okla.	21	----	----	29.5	4
Petit Jean: Danville, Ark.	20	1	6	24.0	4
Arkansas:					
Great Bend, Kans.	8	2	5	9.6	4
Wichita, Kans.	9	4	4	9.4	4
Arkansas City, Kans.	16	1	2	17.4	2
		4	7	17.3	6
Webbers Falls, Okla.	23	Apr. 30	9	25.9	3
Fort Smith, Ark.	22	Apr. 28	10	24.0	Apr. 28
				26.8	3
Van Buren, Ark.	22	Apr. 27	10	24.2	Apr. 28
				26.8	4
Ozark, Ark.	22	3	6	23.3	4
Dardanelle, Ark.	22	Apr. 28	11	23.3	Apr. 29
				26.3	4-5
Morrillton, Ark.	20	3	9	21.8	5
Pine Bluff, Ark.	25	5	7	25.3	6
Red Basin					
Little Missouri: Boughton, Ark.	20	1	5	23.4	2-3
Saline: Benton, Ark.	20	2	3	23.1	2
Ouachita:					
Arkadelphia, Ark.	17	1	6	25.8	2
Camden, Ark.	26	Apr. 25	14	33.1	Apr. 28
				42.0	5
Monroe, La.	40	3	(2)	45.5	18-19
Black: Jonesville, La.	50	4	(2)	53.4	23-24
Little: Whitecliffs, Ark.	25	2	10	29.2	4
Sulphur:					
Hagansport, Tex.	38	1	7	42.9	3
		27	(2)	39.2	28
				----	----
Naples, Tex.	22	1	14	31.7	5
		29	(2)	----	----
Cypress: Jefferson, Tex.	18	2	12	26.5	5
Red:					
Fulton, Ark.	25	2	9	28.1	6
Garland, Ark.	25	5	7	25.5	6
Grand Ecore, La.	33	6	17	36.3	12
Alexandria, La.	32	5	23	38.5	14
Lower Mississippi Basin					
Big Lake Outlet: Manila, Ark.	10	Apr. 12	19	15.5	Apr. 18-19
Tallahatchie: Swan Lake, Miss.	26	7	12	26.6	10
Yazoo: Yazoo City, Miss.	29	Mar. 28	(2)	30.8	Mar. 29
				33.65	Apr. 27
				34.1	1

[1] Provisional.

FLOOD-STAGE REPORT FOR MAY 1944—Continued

River and station	Flood stage	Above flood stages—dates From—	Above flood stages—dates To—	Crest [1] Stage	Crest [1] Date
MISSISSIPPI SYSTEM—continued					
Lower Mississippi Basin—Continued					
Mississippi:	*Feet*			*Feet*	
New Madrid, Mo.	34	Mar. 31	Apr. 9	35.7	Apr. 5
		Apr. 15	17	40.4	Apr. 30
Memphis, Tenn.	34	Apr. 23	17	37.1	5
Helena, Ark.	44	Apr. 29	18	45.9	7-9
Arkansas City, Ark.	42	8	13	42.2	9-11
Greenville, Miss.	39	3	19	41.0	10-11
Vicksburg, Miss.	43	13	17	43.1	15
Red River Landing, La.	45	Apr. 28	(2)	50.8	18-19
Baton Rouge, La.	35	Apr. 24	(2)	41.3	17-23
Plaquemine, La.	31	1	(2)	37.4	19-21
Donaldsonville, La.	28	Apr. 29	(2)	32.6	18-23
Reserve, La.	22	1	(2)	25.3	18-22
New Orleans, La.	17	2	(2)	19.4	21
Atchafalaya:					
Simmesport, La.	41	5	(2)	45.45	22
Melville, La.	37	Apr. 28	(2)	41.4	20-23
Atchafalaya, La.	25	Apr. 10	(2)	26.4	22-28
Morgan City, La.	6	19	29	7.2	23
WEST GULF OF MEXICO DRAINAGE					
Nezpique Bayou: Basile, La.	18	7	11	18.7	9
Calcasieu: Kinder, La.	16	5	11	17.65	9
Sabine:					
Gladewater, Tex.	26	1	16	38.4	7
Logansport, La.	25	1	(2)	35.05	6
Bon Wier, Tex.	7	3	(2)	22.6	10
				21.5	28-29
Neches:					
Rockland, Tex.	22	3	19	31.8	7
		21	26	23.3	23
Beaumont, Tex.	7	11	19	8.2	14
Elm Fork: Carrollton, Tex.	6	2	3	8.3	3
East Fork: Rockwall, Tex.	10	Apr. 30	6	19.0	3
		27	31	12.6	30
Trinity:					
Dallas, Tex.	28	1	6	34.8	2
		23	23	28.9	23
		26	31	33.6	30
Rosser, Tex.	26	1	11	32.4	6
		26	(2)	----	
Trinidad, Tex.	28	1	14	38.6	9
		26	(2)	31.6	29-30
Long Lake, Tex.	40	2	17	49.0	5
Riverside, Tex.	40	8	16	47.8	11
Liberty, Tex.	24	3	June 5	27.8	17-19
Brazos:					
Waco, Tex.	27	1	3	37.0	2
Valley Junction, Tex.	44	3	5	50.4	4
Hempstead, Tex.	40	6	8	42.0	7
Richmond, Tex.	35	10	10	35.0	10
Guadalupe:					
Gonzales, Tex.	20	28	30	26.9	29
Victoria, Tex.	21	30	(2)	----	----
Nueces: Cotulla, Tex.	15	30	(2)	----	----
Rio Grande:					
Lobatos, Colo.	4	11	(2)	6.1	[illegible]
				5.6	26
Embudo, N. Mex.	8	12	(2)	11.2	18-19
Espanola, N. Mex.	7	11	(2)	8.9	17

[2] Continued at end of month.

CLIMATOLOGICAL DATA

CONDENSED CLIMATOLOGICAL SUMMARY OF TEMPERATURE AND PRECIPITATION BY SECTIONS

[For description of tables and charts, see REVIEW Jan. 1943, p. 15]

In the following table are given for the various sections of the climatological service of the Weather Bureau the monthly average temperature and total rainfall; the stations reporting the highest and lowest temperatures, with dates of occurrence; the stations reporting the greatest and least total precipitation; and other data as indicated by the several headings.

The mean temperature for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperatures and precipitation are based only on records from stations that have 10 or more years of observations. Of course, the number of such records is smaller than the total number of stations.

Section	Temperature								Precipitation					
	Section average	Departure from the normal	Monthly extremes						Section average	Departure from the normal	Greatest monthly		Least monthly	
			Station	Highest	Date	Station	Lowest	Date			Station	Amount	Station	Amount
	° F.	° F.		° F.			° F.		In.	In.		In.		In.
Alabama	73.2	+1.7	3 stations	98	[1] 17	Madison	31	7	2.89	-1.06	Atmore State Farm	7.17	Montgomery	1.03
Arizona	64.8	-1.3	Mohawk	104	15	Chinle	18	16	.56	+.24	Sierra Ancha	1.86	16 stations	.00
Arkansas	70.3	+1.1	Corning	96	17	White Rock	28	6	6.42	+1.46	Arkansas City	14.23	Madison	1.45
California	61.0	-.1	Greenland Ranch	106	28	Ellery Lake	7	16	.76	-.24	Crescent City (near)	6.85	26 stations	.00
Colorado	53.3	+.9	3 stations	93	[1] 14	Dillon	-8	4	2.17	+.28	Lamar	7.38	Olathe	.02
Florida	75.4	-.1	Davenport	100	19	Niceville	41	6	2.96	-.95	Kendal	10.13	Nittaw	.30
Georgia	72.8	+1.2	3 stations	99	[1] 18	Tallapoosa	30	7	2.15	-1.24	Summerville	5.61	Griffin	.22
Idaho	54.0	+1.0	Lewiston	95	29	Landmark	1	23	1.21	-.45	Deception Creek	4.14	Rupert	.08
Illinois	67.7	+4.8	2 stations	95	[1] 16	2 stations	27	5	4.19	+.10	Pana	8.21	Quincy AP	1.67
Indiana	68.0	+5.6	4 stations	96	[1] 26	do	28	7	4.39	+.34	La Porte	9.73	Mt. Vernon	1.85
Iowa	64.6	+4.4	Glenwood	95	15	Onawa	23	6	6.13	+2.06	State Center	14.65	Ottumwa (River)	2.96
Kansas	66.4	+2.5	St. Francis	99	15	4 stations	25	[1] 5	3.90	+.09	Trousdale	7.51	Atwood	1.09
Kentucky	70.0	+4.5	Russellville	95	[1] 16	3 stations	29	7	3.62	-.31	Irvington	7.71	Gest	1.55
Louisiana	73.5	-.2	5 stations	95	[1] 15	Plain Dealing	41	5	7.33	+2.71	Logansport	14.39	Burrwood	1.62
Maryland-Delaware.	68.3	+5.4	Cumberland, Md	96	31	Oakland, Md	30	8	2.29	-1.20	Western Port, Md	6.40	Crisfield, Md	.14
Michigan	58.8	+4.5	Wayne	95	26	3 stations	20	[1] 7	2.98	-.26	Michigamme	6.94	Detour	.37
Minnesota	58.1	+2.8	3 stations	91	[1] 16	Cloquet	16	6	5.22	+1.93	Farmington	8.83	Roseau	2.22
Mississippi	72.8	+.9	2 stations	96	29	3 stations	35	7	5.37	+1.10	Cleveland	12.04	Biloxi	1.16
Missouri	68.4	+3.8	Poplar Bluff	99	[1] 28	2 stations	27	7	4.44	-.34	Moselle	13.05	Appleton City	1.56
Montana	54.4	+2.3	2 stations	95	[1] 15	Wise River	11	9	1.98	-.13	2 stations	4.37	Lonepine	.38
Nebraska	63.1	+3.7	do	98	15	Gordon	14	5	3.88	+.49	Osmond	11.53	Haigler	.98
Nevada	56.8	+1.0	Overton	100	[1] 27	2 stations	14	[1] 15	.44	-.40	Lewers Ranch	1.57	4 stations	.00
New England	59.7	+4.5	Fitchburg, Mass	97	31	3 stations	20	19	1.38	-1.95	Dorset, Vt	4.45	Brockton, Mass	.17
New Jersey	65.3	+4.9	4 stations	94	[1] 17	Layton	28	19	1.67	-2.01	Layton	2.43	Barnegat City	.55
New Mexico	59.1	-.5	Maljamar	104	26	Elizabethtown	9	4	1.05	-.19	Lake Maloya	8.02	8 stations	.00
New York	62.3	+6.1	Dansville	96	3	2 stations	22	19	2.83	-.61	Hammondsport	6.73	Orient	.72
North Carolina	70.5	+3.5	3 stations	97	[1] 21	Mount Mitchell	22	7	2.76	-1.24	Newbern	5.86	Concord	.74
North Dakota	58.2	+4.6	2 stations	95	29	Granville	11	5	2.73	+.40	Milnor	7.61	Eckman	.44
Ohio	66.7	+6.0	Chillicothe	94	30	Wauseon	31	6	3.76	+.05	Gallipolis (near)	6.11	Washington C. H.	1.94
Oklahoma	69.4	+1.0	2 stations	102	24	3 stations	30	[1] 5	4.11	-.63	Idabel	12.79	County Line	.67
Oregon	53.1	-.1	do	95	27	Round Grove	10	23	1.13	-.60	Government Camp	5.80	Hermiston	.11
Pennsylvania	65.6	+5.8	Sharon	95	31	Ridgway	27	1	4.28	+.39	Kregar	11.03	Quakertown	1.18
South Carolina	72.7	+1.8	2 stations	99	[1] 16	Caesars Head	35	7	2.07	-1.41	Caesars Head	4.56	St. Paul	.43
South Dakota	61.0	+4.5	White Lake	98	14	3 stations	12	5	3.39	+.52	Centerville	8.28	Bison	.93
Tennessee	70.5	+3.5	Moscow	96	31	Waynesboro	27	7	3.21	-.87	Samburg	7.39	Greenville	1.05
Texas	72.9	-.1	Carrizo Springs	106	23	Mount Locke	33	4	6.51	+2.82	Bronson	21.16	Balmorhea	.29
Utah	55.8	+.3	Zion Park	95	15	Moon Lake	10	3	1.17	-.03	Timpanogos Summit	5.26	2 stations	T
Virginia	69.5	+5.2	Diamond Springs	96	[1] 16	Burkes Garden	20	8	3.01	-.67	Clifton Forge	8.11	Surry	.02
Washington	55.4	+.5	Wahluke (near)	98	27	Paradise R. S	16	11	1.70	-.31	Cedar Lake	11.87	White Swan	.06
West Virginia	67.2	+5.3	Valley Chapel	95	27	2 stations	25	8	4.35	+.38	Spruce Knob	7.59	Kearneysville	1.31
Wisconsin	59.8	+4.4	5 stations	98	30	do	21	[1] 6	3.65	-.01	Weyerhauser	7.57	Plymouth	1.03
Wyoming	52.2	+2.6	2 stations	90	[1] 13	Foxpark	-4	4	2.06	+.02	Alva	4.78	Fletcher Park	.20
Alaska (April)	25.7	-1.7	do	63	[1] 26	Paxson	-50	1	1.09	-.39	Little Port Walter	13.20	2 stations	T
Hawaii	71.6	+.1	Kaanapali	90	[1] 7	Haleakala R. S	36	20	5.69	-.61	Jujui	52.00	11 stations	.00
Puerto Rico	76.2	-.8	Utuado	94	[1] 1	Guineo Reservoir	50	11	8.37	+.30	La Mina	23.53	Mayaguez	2.22

[1] Other dates also.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station	Pressure: Sea level	Pressure: Departure from normal	Temperature of the air: Mean max. + mean min. ÷ 2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean temperature of the dew point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
	Ft.	Ft.	Ft.	Mbs.	Mbs.	Mbs.	°F.	°F.	°F.		°F	°F.		°F.	°F.	°F	%	In.	In.		Mi.								0-10	In.	In.	
New England							**59.1**	**+5.2**									**72**	**1.12**	**−2.0**										**5.0**			
Eastport	75	67	85	1,015.2	1,018.3	+3.7	50.8	+3.1	84	31	61	35	12	41	40	40	72	0.79	−2.2	6	9.2	s.	26	s.	13	15	12	4	4.1	0.0	0.0	0
Greenville, Me	1,070	6	41	978.7	1,018.3		54.0	+4.5	85	5	70	24	2	38	48	42		1.41	−1.8	7		nw.				9	14	8		.0	.0	2
Portland, Me.[1]	103	5	43	1,014.6	1,018.6	+3.7	55.7	+2.4	92	31	68	29	19	44	39	48	76	1.00	−2.4	8	8.9	s.	27	s.	26	15	8	8	4.7	.0	.0	7
Concord [1]	289	4	45	1,007.8	1,019.0	+3.8	60.2	+7.3	93	27	76	30	19	44	50	46	64	1.58	−1.4	6	7.3	nw.	28	nw.	18	11	14	6	5.2	.0	.0	5
Burlington [1]	403	6	51	1,002.4	1,017.6	+2.7	62.1	+5.6	91	27	75	31	20	49	40	50	66	1.75	−1.1	9	10.0	s.	33	se.	13	5	13	13	6.6	.0	.0	3
Boston [1]	124	33	62	1,013.9	1,018.6	+3.4	63.2	+6.1	96	31	73	40	19	54	31	46	60	.25	−2.9	4	10.9	sw.	28	nw.	18	8	12	11	5.6	.0	.0	1
Nantucket	12	11	59	1,018.6	1,019.3	+3.7	57.2	+4.9	79	28	66	39	2	49	23	50	83	1.26	−1.6	5	10.5	sw.	27	sw.	13	16	11	4	4.0	.0	.0	1
Block Island	26	11	46	1,018.3	1,019.6	+4.0	57.4	+4.6	82	28	65	42	19	50	26	51	86	1.26	−2.2	9	12.5	sw.	31	sw.	14	17	8	6	3.8	.0	.0	2
Providence [3]	159	46	60	1,013.2	1,019.6	+4.4	64.2	+5.7	95	31	75	39	19	53	36	48	67	.86	−2.1	4	8.1	s.	24	sw.	13	10	14	7	5.1	.0	.0	1
Hartford [1]	159	5	44	1,013.2	1,019.3	+4.1	64.2	+6.7	92	31	77	35	19	51	37	51	70	1.23	−2.4	7	8.3	s.	28	s.	7	9	11	11	5.6	.0	.0	4
New Haven [1]	107	5	39	1,015.2	1,019.3	+3.7	61.3	+5.9	86	28	72	35	19	50	32	50	72	.93	−2.4	7	6.3	sw.	21	se.	1	9	10	12	5.7	.0	.0	3
Middle Atlantic States							**68.0**	**+5.9**									**72**	**1.95**	**−1.4**										**5.5**			
Albany [1]	97	26	40	1,014.2	1,018.3	+3.1	64.0	+6.3	91	5	76	30	19	52	43	49	62	1.35	−1.2	8	9.2	s.	35	sw.	13	7	12	12	6.4	.0	.0	4
Binghamton [2]	871	60	79	986.8	1,018.6	+3.4	64.2	+6.8	90	31	76	33	19	52	42	52	76	4.85	+1.5	10	5.0	e.	17	sw.	4	2	11	18	7.6	.0	.0	9
New York	314	415	454	1,007.1	1,018.6	+3.0	65.1	+4.5	87	31	74	45	8	57	27	51	66	1.54	−1.7	9	11.4	sw.	46	nw.	22	11	12	8	5.2	.0	.0	4
Harrisburg [1]	374	30	49	1,004.7	1,018.3	+3.1	68.8	+7.0	91	31	81	45	8	57	37	56	72	5.03	+1.6	11	7.4	se.	28	se.	6	5	11	15	6.5	.0	.0	8
Philadelphia [1]	114	6	56	1,014.6	1,019.3	+3.7	67.4	+5.3	89	31	79	46	8	56	34	56	72	2.25	−1.0	9	8.0	sw.	27	s.	6	5	10	16	6.5	.0	.0	5
Reading	323	47	306	1,006.8	1,018.6		68.4	+6.4	90	31	80	46	8	57	34			2.39	−1.3	9	10.1	e.	37	se.	6	7	11	13	6.0	.0	.0	5
Scranton	805	72	104	989.5	1,018.6	+3.4	66.0	+6.6	89	5	78	37	19	54	38			2.56	−.7	9	5.7	n.	34	nw.	13	10	13	8	5.1	.0	.0	6
Atlantic City	52	37	172	1,017.3	1,019.6	+4.4	61.2	+3.1	81	31	67	48	8	55	23	54	84	1.01	−2.0	7	14.7	s.	35	se.	6	11	12	8	4.9	.0	.0	2
Trenton	190	89	107	1,011.9	1,019.0		67.0	+5.9	90	31	78	44	8	56	35	53	66	1.06	−2.0	9	8.2	s.	26	s.	6	7	14	10	5.9	.0	.0	4
Baltimore [2]	123	100	215	1,013.9	1,019.0	+3.4	70.6	+6.2	92	22	80	49	8	61	27	58	71	1.72	−1.8	7	9.6	s.	38	se.	6	10	15	6	5.1	.0	.0	5
Washington [2]	112	56	100	1,014.6	1,019.0	+3.1	71.6	+7.9	92	16	82	48	8	61	35	57	67	1.02	−2.7	9	6.2	s.	26	n.	16	9	16	6	5.3	.0	.0	7
Cape Henry	18	8	54	1,018.0	1,019.0		70.3	+6.1	95	22	78	51	8	62	26	60	78	.50	−3.1	4	9.8	sw.	31	n.	23	17	9	5	3.9	.0	.0	1
Lynchburg	686	144	184	993.9	1,018.6	+2.7	71.6	+4.3	93	31	84	39	8	59	36	57	70	1.98	−1.6	9	6.2	w.	27	nw.	16	14	12	5	4.5	.0	.0	11
Norfolk [2]	91	80	125	1,015.9	1,019.6	+3.7	72.4	+6.2	95	23	82	51	8	63	32	62	79	.85	−3.0	3	8.8	sw.	20	s.	6	12	14	5	4.4	.0	.0	3
Richmond	144	11	52	1,012.9	1,018.3	+2.7	71.8	+5.3	92	16	83	44	8	60	32	59	72	1.12	−2.7	7	7.0	se.	23	nw.	7	14	12	5	4.5	.0	.0	9
South Atlantic States							**73.3**	**+3.2**									**73**	**1.83**	**−1.6**										**4.1**			
Asheville	2,253	77	92	941.1	1,019.6	+4.0	66.8	+4.2	88	23	80	36	8	54	37	54	72	2.85	−.6	10	6.5	se.	23	sw.	22	8	16	7	5.2	.0	.0	10
Charlotte [2]	779	63	86	991.2	1,019.3	+3.7	73.5	+4.6	94	16	85	43	7	62	29	59	68	1.86	−1.8	8	6.5	sw.	24	sw.	6	10	15	6	5.1	.0	.0	4
Greensboro [1]	886	6	56	987.5	1,019.3	+3.0	70.8		91	16	84	39	8	58	35	59	70	1.88		4	6.9	sw.	24	n.	16	13	13	5	4.3	.0	.0	9
Hatteras	11	5	50	1,019.0	1,019.6	+4.0	72.1	+3.4	85	28	78	58	8	66	17	66	84	2.00	−1.7	4	10.7	sw.	29	s.	7	21	7	3	3.2	.0	.0	9
Raleigh [1]	376	27	69				73.4	+5.1	95	23	86	44	8	61	32	60	69	1.55	−2.3	3	8.4	sw.	22	se.	6	17	11	3	3.7	.0	.0	5
Wilmington	72	73	107	1,016.9	1,019.6	+3.3	73.3	+2.5	91	17	82	51	8	64	25	64	80	2.18	−1.3	6	8.6	s.	25	e.	17	23	7	1	2.7	.0	.0	7
Charleston [2]	48	11	92	1,017.3	1,019.3	+3.0	74.4	+1.7	92	28	82	54	7	67	22	64	78	.95	−2.0	3	9.3	s.	27	e.	11	16	13	2	3.8	.0	.0	2
Columbia, S. C.[2]	349	70	91	1,006.4	1,019.3	+3.4	74.6	+2.7	94	17	86	44	7	63	28	61	68	1.76	−1.3	7	7.2	s.	26	sw.	23	14	14	3	4.2	.0	.0	6
Greenville, S. C.[1]	1,040	18	36	982.1	1,019.0		72.3	+5.1	91	17	84	40	7	61	30	58	68	1.98	−2.0	7	7.5	sw.	32	sw.	6	10	18	3	4.7	.0	.0	9
Augusta [2]	182	62	77	1,012.2	1,019.0	+3.4	74.8	+2.4	95	18	87	44	7	63	30	59	59	1.39	−1.6	8	5.2	s.	19	sw.	23	16	11	4	4.1	.0	.0	8
Savannah [2]	65	73	152	1,017.3	1,019.6	+3.7	75.8	+2.4	95	28	86	53	7	66	27	64	79	1.11	−1.9	8	9.6	se.	29	nw.	16	19	10	2	3.5	.0	.0	10
Jacksonville [2]	43	86	110	1,017.6	1,019.3	+3.4	75.6	+.6	93	19	84	53	8	67	23	65	78	2.50	−1.5	7	6.7	e.	24	nw.	23	9	20	2	4.3	.0	.0	7
Florida Peninsula							**77.1**	**−0.5**									**75**	**3.86**	**−0.7**										**4.8**			
Key West [2]	21	10	64	1,015.9	1,016.9	+2.0	78.8	−.3	87	26	84	64	11	74	19	68	74	3.24	−.3	9	8.9	e.	23	nw.	6	9	20	2	4.4	.0	.0	10
Miami [2]	25	242	249	1,016.6	1,017.6	+2.0	75.0	−2.2	84	18	79	63	12	71	14	66	77	5.13	−2.0	11	12.2	ne.	29	ne.	12	6	15	10	5.3	.0	.0	7
Tampa [1]	35	6	43	1,016.9	1,018.6	+3.0	77.4	+1.1	94	19	87	60	8	68	25	66	74	3.20	+.2	8	9.3	e.	36	sw.	20	8	19	4	4.6	.0	.0	12
East Gulf States							**73.9**	**+1.4**									**74**	**2.61**	**−1.2**										**4.8**			
Atlanta [1]	1,173	33	72	977.3	1,018.3	+2.7	72.6	+2.3	92	28	84	38	7	61	31	58	66	1.65	−1.8	8	7.7	nw.	32	w.	23	9	16	6	4.8	.0	.0	7
Macon [2]	370	79	87	1,005.1	1,018.6	+3.0	73.8	+1.5	94	19	86	41	7	62	31	60	68	1.72	−1.2	6	5.6	e.	23	sw.	23	18	7	6	4.1	.0	.0	8
Thomasville	273	49	58	1,009.5	1,019.3	+3.7	75.0	+1.0	95	19	86	48	7	64	29			3.22	−.4	4						7	21	3		.0	.0	5
Apalachicola	35	11	51	1,017.3	1,018.6		74.2	−.4	88	19	81	56	6	67	21	66	77	.99	−2.4	4	7.6	se.	22	e.	26	15	11	5	4.4	.0	.0	4
Pensacola	56	54	79	1,016.6	1,019.0	+3.4	74.8	+.9	92	29	82	50	7	68	24	66	78	1.20	−2.2	4	7.7	se.	26	se.	2	18	10	3	3.7	.0	.0	3
Anniston	741	9					72.0	+2.9	94	29	85	34	7	59	33			2.04	−1.9	6		se.				7	23	1		.0	.0	8
Birmingham [1]	700	5	62	993.6	1,018.6	+3.4	72.0	+2.7	92	20	84	35	7	60	31	60	70	3.58	−.4	9	6.9	s.	32	n.	17	5	20	6	5.6	.0	.0	13
Mobile [2]	57	86	161	1,016.6	1,018.3	+3.4	75.2	+.8	92	15	84	50	7	67	23	64	79	1.28	−3.0	5	5.9	s.	17	s.	26	10	15	6	4.7	.0	.0	5
Montgomery [2]	218	92	105	1,010.8	1,018.6	+3.0	74.6	+1.2	93	16	85	43	7	64	27	62	72	1.03	−2.8	5	5.8	e.	24	sw.	23	16	11	4	3.7	.0	.0	6
Meridian [2]	375	67	92	1,004.4	1,018.0	+2.8	73.3	+2.0	93	29	85	40	7	62	30	62	74	5.68	+1.4	9	5.6	s.	29	s.	20	6	13	12	6.3	.0	.0	12
Vicksburg [2]	247	82	102	1,008.5	1,017.3	+2.4	73.4	+.5	90	30	83	45	7	64	27	63	82	4.36	.0	11	7.8	se.	35	w.	21	5	14	12	5.9	.0	.0	6
New Orleans [4]	53	50	84	1,015.9	1,018.0	+3.1	75.7	+1.3	92	15	84	54	7	68	23	66	78	4.58	.0	8	6.6	se.	26	nw.	20	12	13	6	4.4	.0	.0	7
West Gulf States							**73.2**	**−0.6**									**79**	**7.39**	**+3.2**										**6.4**			
Shreveport [1]	249	5	64	1,007.1	1,015.9	+1.7	72.9	+.3	92	15	82	46	5	64	30	65	82	9.21	+5.0	14	8.8	se.	42	se.	2	6	11	14	6.4	.0	.0	14
Fort Smith	463	57	82	998.3	1,014.2	+.7	71.6	+2.0	91	31	81	40	6	62	33	60	71	6.06	+1.2	16	8.0	e.	32	sw.	25	7	8	16	6.4	.0	.0	13
Little Rock [1]	357	5	58	1,003.4	1,016.3	+2.1	71.4	+1.1	92	15	82	43	7	61	29	62	78	5.02	+.2	14	7.7	sw.	29	s.	19	7	11	13	6.3	.0	.0	14
Austin [1]	605	10	41	992.9	1,014.2		71.8	−2.8	89	23	81	47	5	62	27	63	78	9.25	+4.6	14	9.8	s.	40	se.	1	6	10	15	6.3	.0	.0	10
Brownsville [1]	57	5	54	1,010.8	1,012.9		78.4	−.2	93	22	86	53	6	70	31	69	81	5.26	+2.7	5	13.4	se.	34	se.	4	3	19	9	6.5	.0	.0	8
Corpus Christi [1]	20	4	33	1,013.5	1,014.9	+1.4	74.6	+.1	89	22	82	52	6	67	28	68	84	5.90		8	12.8	se.	38	n.	4	6	11	14	6.7	.0	.0	10
Dallas [1]	512	5	45	995.9	1,013.9		72.3	−.6	91	23	82	45	5	63	30	62	76	8.08	+3.6	14	11.4	s.	34	nw.	1	6	11	14	6.4	.0	.0	10
Fort Worth [1]	679	5	56	990.2	1,014.2	+1.3	72.2	.0	94	23	82	46	5	63	32	60	73	6.42	+1.8	13	11.2	s.	43	nw.	1	6	13	12	6.3	.0	.0	10
Galveston [2]	54	106	114	1,013.5	1,015.6	+1.7	73.7	−1.1	84	15	78	55	4	69	19	68	82	7.34	+3.9	11	12.0	s.	34	nw.	2	9	11	11	5.6	.0	.0	9
Houston [2]	138	157	190	1,010.5	1,015.2		74.0	−1.5	88	14	82	51	5	66	23	66	82	10.10	+5.6	13	10.9	se.	33	se.	1	5	8	18	6.7	.0	.0	9
Palestine	510	64	72	997.6	1,015.6	+2.1	71.7	−1.0	87	31	80	48	5	63	26	62	77	7.69	+3.2	13	7.4	s.	26	se.	1	6	12	13	6.4	.0	.0	8
Port Arthur	34	59	134	1,015.2	1,016.3		74.8	−.4	88	15	81	53	5	68	18	66	80	7.45	+3.3	9	13.6	s.	42	se.	1	7	9	15	6.4	.0	.0	8
San Antonio [1]	693	6	51	989.8	1,013.9	+1.4	71.8	−3.3	92	23	82	45	5	62	33	62	77	6.76	+3.6	12	9.7	se.	47	w.	24	5	6	20	7.3	.0	.0	11

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation: Thermometer above ground	Elevation: Anemometer above ground	Pressure: Station	Pressure: Sea level	Pressure: Departure from normal	Temperature of the air: Mean max. + mean min. ÷ 2	Temp.: Departure from normal	Temp.: Maximum	Temp.: Date	Temp.: Mean maximum	Temp.: Minimum	Temp.: Date	Temp.: Mean minimum	Temp.: Greatest daily range	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precip.: Departure from normal	Precip.: Days with 0.01 inch or more	Precip.: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
	Ft.	Ft.	Ft.	Mbs.	Mbs.	Mbs.	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	%	In.	In.		Mi.								0-10	In.	In.	
Ohio Valley and Tennessee							**70.0**	**+5.9**									**74**	**3.54**	**−0.2**										**5.7**			
Chattanooga [1]	762	6	66	991.5	1,018.6	+3.0	70.8	+5.3	92	16	83	42	8	58	33	62	79	2.50	−1.3	9	6.1	s.	31	s.	6	7	15	9	5.8	T	.0	10
Knoxville [1]	995	27	53	983.4	1,019.0	+2.1	71.8	+5.1	92	20	84	39	7	59	32	58	71	1.55	−2.2	11	6.6	sw.	28	sw.	3	9	16	6	5.0	.0	.0	12
Memphis [4]	399	5	86	1,002.7	1,016.6	+2.0	72.6	+2.2	92	29	82	38	7	62	28	62	76	3.14	−1.0	12	7.0	sw.	27	nw.	24	6	14	11	6.2	.0	.0	10
Nashville [1]	546	5	72	998.0	1,018.0	+2.8	72.2	+4.0	94	29	84	37	7	61	32	58	69	4.33	+.5	7	7.4	s.	27	s.	2	10	15	6	5.3	.0	.0	8
Lexington	989	6		982.7	1,019.0	+3.4	70.8	+6.5	92	30	83	35	7	58	36			3.49	−.3	8		s.				19	8	4	3.6	.0	.0	10
Louisville [2]	525	106	120	998.3	1,017.3	+2.1	72.2	+5.6	90	27	81	40	6	64	25	59	71	4.34	+.6	10	8.2	s.	36	sw.	24	7	22	2	4.8	.0	.0	8
Evansville [1]	431	12	40	1,001.4	1,016.9	+2.0	69.4	+5.1	92	30	80	33	7	58	30	60	75	2.95	−.9	14	6.6	s.	30	sw.	21	5	14	12	6.3	.0	.0	9
Indianapolis [1]	823	5	54	987.1	1,016.9	+2.0	67.4	+6.0	89	27	78	33	6	57	31	59	78	3.33		13	8.5	sw.	33	w.	17	1	17	13	6.6	.0	.0	13
Terre Haute [2]	575	68	149	996.3	1,016.9		70.5	+6.3	94	27	80	35	6	61	28	60	78	2.64	−1.2	11	8.1	s.	31	s.	2	3	20	8	6.1	.0	.0	12
Cincinnati [2]	627	11	51	994.6	1,017.3	+1.7	70.8	+7.7	91	20	82	37	7	60	31	60	75	3.13	−.6	10	6.0	sw.	24	sw.	21	6	18	7	5.9	.0	.0	9
Columbus [2]	822	90	110	988.2	1,018.0	+2.8	69.4	+7.1	90	26	80	41	6	59	33	56	73	4.51	+.9	12	8.7	s.	33	sw.	3	4	15	12	6.5	.0	.0	11
Dayton [1]	1,003	6	55	981.7	1,017.6		67.8	+6.0	90	31	78	35	7	57	33	57	73	3.85	+.2	14	9.6	s.	36	sw.	3	0	20	11	6.7	.0	.0	10
Elkins [2]	1,947	61	78	950.6	1,019.3	+3.4	65.2	+6.0	85	30	79	35	8	52	40	54	78	6.59	+2.5	13	4.7	se.	32	sw.	16	5	16	10	6.1	.0	.0	10
Parkersburg	637	77	84	994.9	1,018.0	+2.4	71.0	+7.2	93	30	83	38	8	59	35	57	70	3.55	+.2	12	5.7	se.	32	nw.	13	8	19	4	4.9	.0	.0	9
Pittsburgh [1]	842	39	54	987.5	1,018.0	+2.4	69.0	+8.8	89	31	80	43	7	58	28	54	64	2.97	−.2	12	8.6	sw.	36	sw.	13	7	18	6	5.4	.0	.0	11
Lower Lake Region							**63.2**	**+6.3**									**72**	**3.32**	**+0.1**										**6.3**			
Buffalo [1]	768	34	96	989.8	1,018.3	+3.4	63.4	+7.5	88	26	74	39	19	53	33	52	73	2.87	−.2	12	10.0	sw.	38	w.	13	3	18	10	6.5	.0	.0	4
Canton	448	10	61	1,000.7	1,016.9		62.0	+7.8	87	3	74	30	19	50	35	49	66	2.18	−.8	9	7.3	w.	29	sw.	13	7	13	11	6.2	.0	.0	4
Oswego	335	71	85	1,005.4	1,018.0	+3.1	59.2	+4.0	87	3	69	33	19	50	39	48	69	2.19	−.8	11	7.8	se.	30	n.	18	8	13	10	5.6	.0	.0	5
Rochester [1]	523	5	69	999.0	1,018.3	+3.4	63.2	+7.1	91	31	74	36	19	52	38	50	70	2.64	−.3	12	7.2	sw.	39	sw.	13	3	14	14	7.1	.0	.0	7
Syracuse [1]	596	5	57	996.3	1,018.0	+2.8	63.2	+6.9	90	5	76	32	19	50	45	52	72	3.19	+.2	11	7.6	sw.	34	w.	5	4	11	16	6.9	.0	0	4
Erie [2]	714	57	81	991.9	1,018.3	+3.1	63.2	+6.4	90	26	72	42	6	55	28	52	75	4.32	+.9	11	6.1	w.	21	ne.	18	4	18	9	6.4	.0	.0	8
Cleveland [1]	762	27	54	989.8	1,018.0	+2.8	65.6	+7.5	92	31	77	40	7	54	36	54	73	3.26	+.1	14	8.3	s.	33	sw.	13	4	15	12	6.3	.0	.0	10
Sandusky	629	5	67	994.6	1,018.0	+2.8	64.6	+5.4	93	26	74	41	6	55	29			4.31	+1.2	15	7.6	e.	25	nw.	17	9	10	12	5.7	.0	.0	10
Toledo [1]	628	5	47	994.6	1,018.0	+3.1	63.6	+5.6	92	26	75	32	6	52	36	55	78	3.17	−.3	15	9.7	sw.	37	sw.	3	8	17	6	4.9	.0	.0	9
Fort Wayne [1]	857	5	33	986.1	1,016.9		64.2	+5.0	88	26	75	34	7	54	32	56	76	4.10	+.2	14	7.2	sw.	29	sw.	3	3	13	15	7.0	.0	.0	12
Detroit [1]	730	5	78	991.2	1,018.0	+3.1	63.3	+6.4	92	26	73	40	6	54	30	52	72	4.34	+1.1	13	7.7	e.	39	n.	26	5	12	14	6.5	.0	.0	10
Upper Lake Region							**57.4**	**+4.9**									**76**	**3.01**	**+0.2**										**7.0**			
Alpena	609	5	89	994.9	1,018.0	+3.1	54.6	+4.1	90	26	63	34	19	46	32	46	77	2.08	−1.0	12	8.3	se.	26	s.	3	4	8	19	7.0	.0	.0	6
Escanaba	612	51	72	993.9	1,016.6	+1.7	53.8	+4.2	83	26	61	32	6	46	29	46	78	3.35	+.4	14	8.5	s.	29	n.	17	3	12	16	6.9	.2	.0	7
Grand Rapids [2]	707	70	244	990.9	1,016.9	+2.0	63.0	+5.0	91	30	73	34	6	53	29	53	78	2.11	−1.3	14	10.1	sw.	43	s.	3	5	10	16	6.7	.0	.0	7
Lansing [2]	878	5	90	985.4	1,017.6		60.9	+4.0	85	30	70	32	6	51	33	53	77	4.36	+.9	14	7.2	s.	25	sw.	3	6	6	19	6.8	.0	.0	10
Ludington	637	60	66																													
Marquette	734	44	73	988.8	1,016.6	+1.7	53.6	+4.6	91	30	62	30	5	45	33	44	76	1.97	−1.0	15	7.1	n.	28	s.	4	3	12	16	7.3	3.6	.0	3
Sault Ste. Marie [1]	614	11	52	994.6	1,017.6	+3.4	54.4	+6.2	84	30	65	29	8	44	35	44	74	1.23	−1.4	12	9.4	se.	38	sw.	4	4	8	19	7.4	.0	.0	6
Chicago [1]	673	5	36	991.5	1,015.6	+1.0	64.4	+6.6	91	30	74	34	5	54	32	54	75	4.36	+.9	15	8.4	s.	39	s.	25	3	12	16	7.1	T	.0	15
Green Bay	617	109	141	993.2	1,015.9	+1.7	59.9	+5.0	89	30	69	34	6	51	30	49	72	1.20	−2.3	10	9.8	s.	38	s.	3	2	11	18	7.4	.0	.0	6
Milwaukee [1]	681	33	22	991.2	1,016.3	+1.7	57.8	+5.2	89	26	68	33	5	48	35	50	78	2.33	−1.0	13	11.4	ne.	54	sw.	3	2	11	18	7.5	.0	.0	8
Duluth [5]	1,133	5	47	973.9	1,015.6	+1.0	51.3	+4.0	90	30	61	23	6	42	31	42	77	7.12	+3.9	14	11.9	ne.	40	nw.	3	9	8	14	6.0	T	.0	8
North Dakota							**59.0**	**+5.3**									**68**	**3.02**	**+0.7**										**6.2**			
Fargo [1]	940	5	43	978.7	1,013.2	−.7	58.5	+3.4	86	29	69	24	4	48	35	50	75	4.70	+1.8	17	12.5	e.	44	nw.	3	4	11	16	6.7	.3	.0	12
Bismarck [1]	1,677	5	43	952.6	1,012.2	−1.0	60.2	+7.2	90	30	73	19	5	47	42	47	67	2.45	+.1	11	12.5	e.	45	e.	17	8	12	11	6.0	T	.0	6
Devils Lake	1,478	11	44	960.4	1,013.9	.0	58.0	+5.4	92	29	70	21	5	46	38	46	70	4.00	+2.0	13	9.0	e.	34	nw.	3	8	10	13	6.4	.2	.0	8
Lemmon, S. Dak	2,602	4	38																													
Grand Forks [1]	832	4	41	983.7	1,014.2		57.8		91	30	70	24	4	46	38	46		3.13		17		s.				3	13	15		1.0	.0	7
Williston	1,878	42	50	945.5	1,011.9	−1.6	59.2	+5.2	92	30	71	24	4	48	39	42	60	.94	−1.1	10	8.1	se.	28	e.	18	7	13	11	5.8	T	.0	8
Upper Mississippi Valley							**66.0**	**+4.6**									**76**	**4.68**	**+0.6**										**7.1**			
Minneapolis-St. Paul [1]	919	43	74	980.0	1,013.5	−.4	62.4	+4.7	89	29	72	30	6	53	29	52	72	6.15	+2.5	12	10.7	e.	50	e.	18	1	11	19	7.6	T	.0	10
Springfield, Minn	1,025	4	42	976.0	1,012.9		62.6		90	31	72	27	5	53	29	52	74	5.13		10		e.				6	9	16		T	.0	9
La Crosse [1]	714	5	29	988.2	1,014.2	+.3	62.2	+4.3	86	31	72	30	6	52	32	54	77	3.48	−.3	16	8.0	s.	43	e.	19	3	9	19	7.7	T	.0	11
Madison [2]	974	70	78	980.4	1,015.6	+1.0	62.4	+4.8	87	30	71	34	5	54	29	54	76	3.53	−.3	14	7.1	se.	32	sw.	3	2	13	16	7.2	.0	.0	11
Charles City	1,015	10	51	978.0	1,014.6	+.7	62.9	+5.1	88	14	73	28	5	53	36			5.25	+.9	17	6.3	se.	25	sw.	3	3	13	15	7.0	1.5	.0	9
Davenport [1]	606	6	50	993.2	1,015.6	+1.4	66.2	+5.9	90	15	76	34	5	57	33	56	74	4.60	+.7	17	9.1	e.	47	sw.	3	1	11	19	7.6	T	.0	13
Des Moines [3]	860	5	99	982.4	1,013.2	−.3	65.6	+4.3	88	15	75	31	5	56	31	56	78	7.39	+2.8	19	9.0	se.	35	sw.	3	4	9	18	7.0	.4	.0	19
Dubuque	699	81	96	989.5	1,014.9	+.7	64.6	+4.3	90	15	74	34	5	55	36	54	74	4.68	+.5	15	5.3	s.	22	sw.	3	3	10	18	7.2	T	.0	13
Burlington [1]	702	4	56	989.8	1,015.2	+1.3	66.2	+3.6	93	15	77	32	5	56	34	58	78	4.74	+.6	16	9.3	s.	42	sw.	3	1	14	16	7.5	1.0	.0	17
Cairo	357	5	99	1,004.1	1,016.6	+2.0	72.2	+2.8	92	16	81	39	6	63	26			3.79	+.1	11	7.3	sw.	26	s.	2	5	12	14	6.5	.0	.0	10
Peoria [1]	609	6	26	993.9	1,015.9	+1.3	66.4	+5.7	90	30	76	31	6	56	36	58	78	4.12	+.1	13	8.3	sw.	40	sw.	3	1	22	8	6.4	T	.0	14
Springfield, Ill. [3]	636	5	191	992.9	1,015.6	+1.4	69.8	+6.6	92	20	79	34	6	60	27	58	79	4.26	−.1	12	10.0	s.	34	s.	3	2	12	17	7.1	.0	.0	14
St. Louis [5]	568	6	303	995.3	1,015.9	+1.7	70.6	+3.6	91	29	79	35	6	62	22	58	71	4.15	−.2	12	10.3	s.	36	s.	2	8	14	9	5.9	.0	.0	10
Missouri Valley							**66.5**	**+4.7**									**72**	**3.52**	**−0.5**										**6.3**			
Columbia, Mo [3]	784	6	66	986.8	1,014.9	+1.0	69.2	+4.2	90	15	79	35	5	60	29	58	74	4.02	−.4	13	6.8	s.	24	sw.	3	1	16	14	6.8	T	.0	12
Kansas City [1]	963	38	76	979.3	1,013.5	+.3	69.5	+4.7	93	19	79	32	5	60	31	56	69	4.14	+.2	12	11.3	s.	36	sw.	3	5	13	13	6.7	T	.0	12
St. Joseph [2]	967	11	49	979.0	1,013.2		68.5	+4.3	93	19	78	32	5	59	29	56	72	4.40	−.3	13	8.9	s.	31	w.	3	15	10	6	4.1	T	.0	10
Springfield, Mo. [1]	1,324	5	60	968.5	1,015.2	+1.7	66.6	+2.9	85	15	76	29	6	57	28	58	79	2.87	−2.3	11	9.7	s.	30	sw.	3	3	12	16	6.8	T	.0	8
Topeka	987	65	87	978.3	1,013.2		69.1	+4.8	96	19	80	30	6	58	30	57	72	2.81	−1.7	11	9.2	s.	25	s.	25	5	13	13	6.3	T	.0	9
Lincoln [2]	1,189	11	81	970.5	1,012.3	−.6	66.6	+4.9	93	15	77	29	6	57	30	54	71	2.50	−1.6	14	10.0	s.	43	w.	3	6	9	16	6.7	.1	.0	9
Omaha [1]	1,105	5	68	973.6	1,013.2	.0	66.8	+4.4	94	15	76	29	5	57	29	54	69	4.21	+.4	15	11.8	s.	38	sw.	18	7	7	17	6.7	T	.0	12
Valentine	2,598	46	54	921.4	1,012.2	−.3	61.5	+5.3	90	15	74	23	5	48	42	45	63	2.09	−.7	15	9.8	s.	31	se.	17	5	17	9	5.8	T	.0	13
Sioux City [1]	1,138	5	40	971.9	1,012.2	−1.0	64.6	+5.0	91	15	76	26	6	54	33	53	72	4.77	+.7	13	10.7	e.	38	w.	25	3	10	18	7.0	T	.0	9
Huron [1]	1,301	5	41	965.5	1,011.9	−1.3	62.9	+6.5	92	15	74	23	4	52	33	52	74	3.34	+.4	10	13.8	se.	40	e.	18	4	17	10	6.2	.1	.0	8

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation of instruments: Barometer above sea level	Elevation of instruments: Thermometer above ground	Elevation of instruments: Anemometer above ground	Pressure: Station	Pressure: Sea level	Pressure: Departure from normal	Temperature of the air: Mean max. + mean min. ÷ 2	Temperature of the air: Departure from normal	Temperature of the air: Maximum	Temperature of the air: Date	Temperature of the air: Mean maximum	Temperature of the air: Minimum	Temperature of the air: Date	Temperature of the air: Mean minimum	Temperature of the air: Greatest daily range	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Precipitation: Departure from normal	Precipitation: Days with 0.01 inch or more	Wind: Average hourly velocity	Wind: Prevailing direction	Wind: Maximum velocity: Miles per hour	Wind: Maximum velocity: Direction	Wind: Maximum velocity: Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
	Ft.	Ft.	Ft.	Mbs.	Mbs.	Mbs.	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	%	In.	In.		Mi.								0-10	In.	In.	
Northern Slope							**56.4**	**+3.2**									**60**	**2.20**	**-0.1**										**6.4**			
Billings [1]	3,570	16	40	889.3	1,011.9		59.2	+3.1	87	29	72	31	4	47	44	36	50	.73		7	11.0	s.	42	n.	2	3	14	14	6.6	.0	.0	9
Havre	2,507	11	67	924.5	1,012.5	.0	59.3	+5.9	90	16	73	28	3	45	43	38	52	1.37	-.7	11	8.7	sw.	30	sw.	9	2	15	14	6.5	.0	.0	7
Helena [1]	4,124	5	43	872.3	1,013.5	.0	53.6	+2.0	88	15	67	26	23	40	47	38	60	1.79	-.2	11	9.0	w.	34	ne.	2	5	13	13	6.5	T	.0	10
Missoula [2]	3,205	80	91	901.1	1,014.9		55.2	+2.4	86	27	68	31	3	43	44	37	60	1.69	-.3	12	6.8	e.	32	nw.	12	6	13	12	6.3	T	.0	8
Kalispell	2,973	48	56	910.6	1,013.2	+1.3	53.7	+2.3	82	27	65	31	3	42	40	38	60	1.48	.0	14	6.3	w.	19	se.	27	4	13	14	6.5	T	.0	3
Miles City [1]	2,371	5	28	929.2	1,012.5	-.4	59.6		93	30	72	30	4	47	41	46	66	1.49		12		nw.				5	11	15	6.5	T	.0	10
Rapid City [1]	3,259	5	63	900.1	1,012.5	.0	57.8	+3.8	85	29	70	22	5	46	39	44	64	3.53	+.6	11	14.2	nw.	52	nw.	3	9	13	9	5.6	T	.0	12
Cheyenne [1]	6,094	5	40	812.1	1,011.9	+1.1	52.4	+2.1	84	13	66	24	5	38	42	36	63	2.00	-.4	17	11.8	nw.	44	w.	18	1	17	13	6.6	1.8	.0	10
Lander	5,352	60	68	834.1	1,011.9	.0	53.8	+2.6	82	14	67	29	4	41	43	36	57	1.89	-.4	12	5.8	sw.	27	s.	15	2	20	9	6.4	3.7	.0	5
Sheridan [1]	3,790	5	38	882.8	1,013.2		55.8	+3.8	85	14	68	29	8	43	39	40	64	3.46	+.8	13	9.4	nw.	47	nw.	3	4	14	13	6.6	.7	.0	10
North Platte [2]	2,821	11	51	914.0	1,011.5	-.3	63.0	+4.3	90	15	76	26	5	50	40	46	64	2.60	-.2	11	8.9	s.	30	w.	14	8	13	10	5.9	.0	.0	13
Middle Slope							**65.0**	**+1.9**									**67**	**3.47**	**-0.2**										**6.2**			
Denver [2]	5,292	106	113	836.8	1,011.9	+1.4	58.5	+2.3	84	15	70	30	3	48	35	37	54	1.35	-.9	7	7.5	s.	27	n.	7	6	11	14	6.1	8.3	.0	10
Pueblo [1]	4,690	5	36	855.1	1,011.5	+1.3	59.8	+.9	89	15	76	29	4	44	46	36	52	1.90	+.3	9	8.9	nw.	42	sw.	17	11	11	9	5.1	T	.0	8
Concordia	1,392	50	58	963.4	1,012.5	-.4	66.4	+3.2	91	15	76	29	6	56	31	55	70	3.83	-.4	9	8.3	s.	27	sw.	21	7	10	14	6.4	.0	.0	11
Dodge City [1]	2,509	5	58	925.2	1,011.5	.0	63.8	+.3	87	15	75	32	6	53	36	52	73	6.95	+4.1	11	16.2	s.	50	ne.	13	7	10	14	6.0	.0	.0	11
Wichita [1]	1,358	6	64	965.1	1,012.9	+.4	67.8	+2.7	89	18	78	33	6	58	27	56	72	2.04	-2.4	7	14.4	s.	40	nw.	2	5	13	13	6.4	.0	.0	9
Oklahoma City [2]	1,214	10	47	970.5	1,013.2	+1.0	69.8	+2.1	90	14	79	37	6	60	30	58	71	2.72	-2.2	10	8.8	s.	24	s.	7	6	7	18	6.9	.0	.0	8
Tulsa [1]	674	10	61	990.2	1,013.9		69.2	+2.0	88	15	79	36	6	60	34	60	76	5.50	+.4	11	10.5	s.	49	sw.	25	6	11	14	6.4	.0	.0	11
Southern Slope							**70.0**	**+0.2**									**59**	**2.96**	**+0.2**										**5.6**			
Abilene [1]	1,738	4	41	952.3	1,011.9	+.4	71.1	+.5	92	23	82	44	5	60	38	56	70	4.70	+.7	13	13.0	s.	39	s.	7	5	16	10	6.2	.0	.0	13
Amarillo [1]	3,676	5	42	887.6	1,011.2	+.7	65.2	+3.1	89	23	78	37	4	52	42	47	63	3.72	+.9	7	14.1	se.	58	w.	31	8	8	15	5.8	.0	.0	7
Del Rio	960	63	71	978.7	1,010.8	.0	75.2	-1.8	97	2	86	49	5	65	36	60	64	3.27	+.4	10	10.3	se.	37	nw.	20	6	14	11	6.1	.0	.0	12
Roswell	3,566	75	85	891.0	1,010.5	+.7	68.4	-1.0	94	31	84	34	5	53	48	38	40	.14	-1.0	4	8.5	s.	29	se.	30	15	10	6	4.3	.0	.0	5
Southern Plateau							**68.7**	**+0.6**									**38**	**0.52**	**+0.2**										**3.3**			
El Paso [1]	3,778	5	85	884.5	1,009.1	+.6	71.7	+1.7	92	12	84	46	4	59	43	34	29	.39	+.1	2	11.8	s.	38	n.	3	19	7	5	3.7	.0	.0	4
Albuquerque [1]	5,314	5	45	837.1	1,009.8		63.9	+.6	87	15	77	40	4	50	38	36	40	.57	.0	7	10.7	sw.	50	n.	3	14	11	6	4.5	.0	.0	5
Flagstaff	6,907	36	51	790.7	1,014.9		50.9	+.2	75	28	66	29	17	36	40	28	51	.99	+.1	5		sw.				15	11	5		3.3	.0	3
Phoenix [2]	1,107	39	87	971.9	1,009.8	+1.3	75.6	+.6	98	13	90	50	17	61	39	40	38	.80	+.7	2	6.8	e.	22	w.	16	19	9	3	3.1	.0	.0	1
Tucson [1]	2,555	6	30	923.8	1,010.2		73.4	+.2	101	13	89	46	17	58	40	34	28	.37	+.2	2		w.				17	10	4	3.6	.0	.0	1
Yuma	142	9	54	1,005.4	1,009.5	+.7	76.8	+.6	101	13	93	52	17	61	42	44	40	T	.0	0	6.4	s.	24	w.	16	24	7	0	1.8	.0	.0	0
Independence	3,957	5	26																													
Middle Plateau							**57.0**	**+1.6**									**46**	**0.71**	**-0.2**										**5.0**			
Reno [1]	4,527	20	52	861.5	1,013.5	+.6	55.0	+2.1	85	5	73	28	16	37	54	32	50	.37	-.3	3	8.3	ne.	45	sw.	14	12	13	6	4.4	T	.0	2
Tonopah	6,090	9	20	813.4	1,011.9		56.2	+.9	77	22	68	30	16	44	20	28	38	.10	-.3	3		se.				16	12	3		T	.0	1
Winnemucca	4,339	5	56	866.2	1,012.5	-.4	55.5	+1.6	84	13	72	28	24	39	49	30	44	.73	-.2	8	7.9	sw.	32	sw.	15	9	12	10	5.3	.0	.0	2
Modena	5,473	10	46	832.7	1,012.2	+2.4	53.5	.0	80	13	70	28	4	38	42			.81	.0	4	11.3	sw.	35	sw.	22	12	10	9	4.7	T	.0	5
Salt Lake City [1]	4,227	32	58	865.9	1,012.2	+1.0	58.9	+3.2	85	14	72	30	3	46	35	37	50	1.67	-.1	7	10.5	s.	34	s.	16	6	13	12	5.7	.0	.0	6
Grand Junction	4,602	60	68	858.1	1,011.9	+1.7	62.2	+1.1	86	13	74	35	3	50	35	35	42	.59	-.2	8	7.0	se.	31	w.	14	7	18	6	5.1	T	.0	11
Northern Plateau							**57.6**	**+1.8**									**54**	**0.82**	**-0.6**										**6.0**			
Baker [2]	3,471	36	54	895.0	1,014.9	+.3	53.2	+1.5	83	28	68	24	2	39	44	32	55	1.28	-.3	3	6.4	n.	19	n.	21	5	18	8	5.6	T	.0	5
Boise [1]	2,739	5	49	918.4	1,013.2	-.7	58.6	+2.5	87	14	72	30	2	45	41	38	53	.36	-1.1	4	10.7	nw.	35	s.	14	11	11	9	5.3	T	.0	4
Pocatello [1]	4,478	5	31	861.2	1,013.2	+1.0	55.4	+2.4	82	28	69	27	3	42	43	34	53	1.31	-.4	8	9.9	sw.	35	sw.	1	7	9	15	6.7	T	.0	5
Spokane [1]	1,929	27	42	946.2	1,014.6	.0	56.8	+1.3	87	27	69	32	2	44	42	38	54	.94	-.5	9	7.8	sw.	30	sw.	22	3	13	15	6.9	T	.0	5
Walla Walla	991	57	65	979.7	1,014.9	+.3	61.1	+1.5	90	27	72	42	10	50	35			.85	-.8	9	6.7	sw.	24	sw.	21	7	15	9	5.7	.0	.0	4
Yakima	1,076	58	67	976.3	1,014.9		60.7	+1.7	90	27	73	35	10	49	39			.15	-.5	3	7.4	nw.	22	w.	21	7	13	11	5.9	.0	.0	2
North Pacific Coast Region							**55.6**	**+1.0**									**69**	**1.51**	**-0.8**										**6.3**			
North Head	211	5	56	1,010.8	1,018.3	+1.4	52.4	+1.5	81	3	58	42	10	47	28	45	78	1.96	-1.0	13	14.8	n.	48	se.	15	5	7	19	7.2	.0	.0	0
Seattle [2]	125	90	321	1,013.2	1,017.6	+1.3	57.0	+.4	86	27	66	40	10	48	31	43	65	1.14	-.7	11	9.8	s.	36	sw.	20	7	10	14	6.1	.0	.0	1
Tacoma	194	172	201	1,010.8	1,017.3	+.7	55.4	+1.3	87	27	64	37	10	47	34			1.45	-.7	14	9.0	n.	29	s.	15	10	11	10	5.3	.0	.0	4
Tatoosh Island	86	9	61	1,014.9	1,018.0	+1.7	50.8	+1.2	67	2	55	40	10	46	23	44	80	2.59	-1.4	15	12.6	s.	38	e.	12	3	11	17	7.4	.0	.0	0
Medford [1]	1,329	29	58	969.2	1,016.3		58.0	-.2	90	4	73	33	16	43	48	38	58	.66	-.4	4		nw.				8	13	10	5.7	.0	.0	2
Portland, Oreg. [2]	154	68	106	1,012.5	1,017.6	+.7	59.0	+2.1	88	27	68	40	10	50	31	45	68	1.07	-1.1	11	7.3	nw.	20	e.	2	6	11	14	6.3	.0	.0	2
Roseburg	510	45	76	999.7	1,018.0	+1.1	56.7	+.7	90	3	69	38	2	45	47	42	66	1.67	-.3	9	4.5	n.	22	sw.	31	8	9	14	6.0	.0	.0	0
Middle Pacific Coast Region							**60.0**	**+0.4**									**67**	**1.93**	**+0.7**										**5.0**			
Eureka	60	72	88	1,016.9	1,018.6	+1.0	51.8	-.2	64	2	56	40	10	48	18	46	84	3.49	+1.7	11	8.2	n.	27	n.	22	10	7	14	5.9	.0	.0	0
Redding [1]	722	20	31	988.2	1,013.5		66.7	+.3	92	26	78	45	15	56	29	40	44	2.45	+.9	4	8.5	nw.	25	n.	22	14	7	10	5.0	.0	.0	3
Sacramento	66	92	115	1,011.9	1,013.5	-.4	64.8	+1.5	93	26	78	45	11	52	35	46	60	.83	+.1	3	8.1	s.	20	sw.	10	16	8	7	4.0	.0	.0	0
San Francisco [2]	155	112	132	1,010.5	1,015.6	.0	56.8	.0	76	4	63	49	23	51	25	48	81	.94	+.1	4	9.9	w.	29	sw.	14	9	12	10	5.1	.0	.0	0

See footnotes at end of table.

CLIMATOLOGICAL DATA FOR WEATHER BUREAU STATIONS—Continued

District and station	Elevation in instruments: Barometer above sea level	Thermometer above ground	Anemometer above ground	Pressure: Station	Sea level	Departure from normal	Temperature of the air: Mean max. + mean min. ÷ 2	Departure from normal	Maximum	Date	Mean maximum	Minimum	Date	Mean minimum	Greatest daily range	Mean temperature of the dew-point	Mean relative humidity	Precipitation: Total	Departure from normal	Days with 0.01 inch or more	Wind: Average hourly velocity	Prevailing direction	Maximum velocity: Miles per hour	Direction	Date	Clear days	Partly cloudy days	Cloudy days	Average cloudiness, tenths	Total snowfall	Snow, sleet, and ice on ground at end of month	Number of days with thunderstorms
	Ft.	Ft.	Ft.	Mbs.	Mbs.	Mbs.	°F.	°F.	°F.		°F.	°F.		°F.	°F.	°F.	%	In.	In.		Mi								0-10	In.	In.	
South Pacific Coast							64.9	+1.4									62	0.18	-0.2										5.7			
Fresno [1]	327	5	35	1,001.7	1,012.9	-.3	69.6	+2.4	95	26	84	47	16	55	36	44	46	.29	-.2	4	7.7	nw.	23	nw.	29	17	8	6	3.9	.0	.0	0
Los Angeles	338	223	250	1,003.7	1,015.2	+1.0	62.4	+.2	90	4	71	49	16	54	36	50	71	.02	-.4	1	6.5	w.	24	sw.	15	6	13	12	6.1	.0	.0	0
San Diego [1]	87	20	55	1,012.9	1,015.2	+1.0	62.8	+1.5	84	4	70	51	19	56	29	52	70	.22	-.1	4	7.2	sw.	17	w.	16	2	14	15	7.0	.0	.0	0
West Indies																																
San Juan, P. R.	82	13	54																													
Panama Canal																																
Balboa Heights	118	6	92		[1] 1,010.8	+1.0	80.4	-.3	92	2	87	71	8	74	21		[3] 87	8.35	+.3	19	5.8	nw.	21	nw.	11	0	15	16	7.5	.0	.0	3
Cristobal	27	47	97		[3] 1,011.2	+.7	80.2	-.5	89	26	84	73	12	75	13	74	84	25.43	+12.7	24	9.3	ne.	24	ne.	3	1	9	21	8.1	.0	.0	5
Alaska																																
Anchorage [1]	132	6	44	1,004.4	1,009.5		45.0	.0	61	21	53	31	9	37	25	45	68	.51	.0	7	6.3	nw.	25	sw.	4	1	5	25	8.3	.0	.0	0
Fairbanks [1]	155	4	63	989.8	1,006.8		48.6	+1.7	70	23	60	25	1	37	34	35	64	1.75	+1.1	11	7.4	e.	33	sw.	12	1	8	22	8.0	T	.0	2
Juneau [1]	80	11	50	1,012.9	1,015.9		46.2		64	23	53	29	9	40	32	39	78	4.27		21	9.1	e.	39	e.	19	3	2	26	8.5	.0	.0	0
Nome	22	25	56	1,006.4	1,007.1		34.0	-.1	56	25	40	6	3	28	25	30	86	.96	+.3	12	7.8	e.	22	e.	22	1	11	19	7.8	.3	.0	0
Gambell	32	5	32	1,007.1	1,008.5		28.9	-1.2	42	10	33	12	3	25	16	28	92	.32	+.2	10	12.0	ne.				1	3	27	8.0	1.9	1.5	0
Ketchikan	75	69	90	1,015.9	1,016.6		48.2	-.4	69	22	54	36	6	42	27	42	81	14.16	+5.6	19	7.7	se.	23	w.	23	2	5	24	8.4	.0	.0	0
Kotzebue	20	5	31	1,007.8	1,008.5		28.2	-1.7	47	29	35	-8	3	22	30	26	90	.36	+.1	8		w.				4	10	17	7.3	.3	T	0
McGrath	331	5	31	993.6	1,006.1		44.9		64	25	54	26	2	35	31	33	64	1.97	+.7	6		nw.				0	7	24	8.9	.1	.0	0
Northway	1,718	5	32	945.8			46.4		75	23	59	26	1	34	35	30	58	.14		4	6.8	w.	22		12	1	6	24	7.9	T	.0	0
Summit	2,405	5	30	923.1	1,010.8		37.1		54	29	44	21	20	30	27	32	82	2.00		10		w.				0	0	31		6.5	.0	0
Bethel	28	7	31	1,004.1	1,005.4		40.9	+.4	59	28	49	19	3	33	24	34	80	2.50	+1.6	12	9.4	n.	29		13	1	12	18	7.6	T	.0	0
Hawaiian Islands																																
Honolulu	38	86	100	1,017.3	1,018.0		75.4	+.6	81	26	80	67	21	71	13			.56	-1.2	9	10.0	e.	23	e.	30	19	11	1	3.1	.0	.0	0

[1] Data are airport records.
[2] Barometric data (adjusted to old city elevation) and hygrometric data from airport; otherwise city office records.
[3] Observations taken bihourly
[4] Pressure (adjusted to old city elevation) temperature and hygrometric data from air port; otherwise city office records.
[5] Temperature and precipitation from city office records, other data from airport.

NOTE.—Except as indicated by notes 1, 2, 4, and 5 data in table are city office records.

SEVERE LOCAL STORMS, MAY 1944

[The table herewith contains such data as has been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Utica, Kans., and vicinity.	1	4:30-5:30 p. m.	[1] 7		$1,000	Heavy hail	Hail covered the ground. Property damaged; crops not advanced sufficiently to be hurt much; path 12 miles long.
Kimbro, New Sweden, and Hutto, Tex., and vicinities.	1	4:30-6:30 p. m.	2,640	3	100,000	Tornadoes	A series of small tornadoes occurred; 8 persons injured in a path 10 miles long.
Bloom, Kans., and vicinity.	1	6 p. m.	800		1,000	Tornado and hail	Damage mostly to rural property from wind; path 6 miles long.
Fall City, Nebr., and vicinity.	1	7-8 p. m., C. W. T.	[1] 5	0		do	Several thousand dollars' loss by hail to oats, strawberries, and truck. A small tornado in the vicinity demolished a garage, damaged a car, killed chickens, and damaged all outbuildings with about $2,000 damage.
Marlin, Tex.	1	8:30 p. m.	2,640		250,000	Hail	Loss mostly to crops; small loss to property.
Payne County, Okla.	1	9:30 p. m.	[1] 5		1,500	Wind	Property damaged.
Garfield County, Okla.	2	7 p. m.	67	0	1,000	Tornado	Damage to farm buildings.
Grady County, Okla.	2	8 p. m.	100	0	5,500	do	Property damage, $5,000; loss in crops, $500; path 6 miles long.
Fort Wayne, Ind.	3				3,000	Wind and hail	Trees, poles, and wires down; buildings damaged.
Wisconsin, southeastern portion.	3-4	12 p. m., 3d-2:15, 4th			5,000	Wind	Damage greatest in Milwaukee where wires and signs blew down and utility service was disrupted, because of fallen trees.
Cortland County, N. Y.	7	a. m.		0		Tornadic winds	Buildings unroofed and some demolished; trees uprooted and power and communication lines broken by falling trees and branches.
Minneapolis, Minn.	10	11:47 a. m., C. W. T.			50,000	Thundersquall	Wires blown down, trees uprooted, and 4 gliders were pulled loose from their moorings and partially wrecked at the Wold-Chamberlain Airport.
Minneapolis, Minn.	10	p. m.				Heavy rain and flood	Hundreds of basements flooded; streetcars and automobile traffic blocked in places and the level of the already swollen Minnehaha Creek raised.
Dodge City, Kans., and vicinity.	12	11:55-11:57 p. m.			10,000	Heavy hail	Property damaged.
Rosebud County, Mont.	14	10 p. m.	[1] 1			do	Some young lambs injured or killed. Hail up to size of a hen's egg; path 10 miles long.
Shelby County, Ind.	17	7:30 p. m.	[1] 3		45,000	Wind	Trees, poles, and wires down; buildings damaged.
Belleview, W. Va.	17					Electrical and hail	Heavy damage to crops.
Marshall, W. Va.	17				2,000	Rain and flood	Property damaged.
Lake Bento, Minn.	17-18				80,000	Heavy rain	Excessively heavy rains that accompanied a severe thunderstorm washed out railroad tracks, causing a wreck. Highways, bridges, and growing crops damaged.

[1] Miles instead of yards.

SEVERE LOCAL STORMS, MAY 1944—Continued

[The table herewith contains such data as has been received concerning severe local storms that occurred during the month. A revised list of tornadoes will appear in the United States Meteorological Yearbook]

Place	Date	Time	Width of path, yards	Loss of life	Value of property destroyed	Character of storm	Remarks
Washington and Burt Counties, Nebr.	18	1:45-2 p. m., C. W. T.	170-500	0	175,000	2 tornadoes	Originated in Spiker community, southwest of Herman, in Washington County and moved north-northeastward through northwestern Washington County and central Burt County, passing about 1½ miles west of Tekamah. Principal damage to houses and other farm buildings and equipment with a considerable portion of these destroyed. Another tornado of lesser violence in Nebraska originated northeast of Tekamah at about the same time as the above tornado and moved northeastward, causing much damage to buildings and equipment on 3 farms. In both tornadoes the loss of livestock was noted. Amount given, estimate of damage from the 2 storms.
Rosebud County, Mont.	18	4 p. m.	[1] 5			Heavy hail	Shingles torn from houses. Storm mostly over grazing land. Path 15 miles long.
Minneapolis, Minn., and vicinity.	18	10:59 p. m., C. W. T.			25,000	Thundersquall	12 Army gliders pulled loose from their moorings at the Wold-Chamberlain Airport. 8 being wrecked and 4 damaged. Number of trees uprooted, property damaged, and wires down at several places.
Brown County, Minn.	18	P. m., C. W. T.	[1] 2½		8,000	Electrical and hail	Storm moved from southwest to northeast over a path 10 miles long. Loss in growing crops, $6,000; property damage and poultry killed, $2,000.
Nicollet, Minn., vicinity of.	18				3,000	Electrical	450 chickens perished when lightning set fire to the coops. Some rural telephones out of commission.
Fort Dodge and Pocahontas, Iowa, vicinity of.	18	P. m.		1	1,000,000	Tornadoes	Property damaged; 12 persons injured, 3 seriously.
Stuart, Va.	20	4 p. m.	[1] 2		25,000	Hail	Loss in fruit crop.
Knox City, Tex.	20	8:15 p. m.	880	0	32,000	Tornado and hail	Property damage, due to wind, $7,000; loss in crops from hail, $25,000.
Iowa	20			5	1,000,000	Heavy rain, flood, and tornadoes.	Flood waters continued to spread over additional thousands of areas of croplands.
San Antonio, Tex.	21	2:40 a. m.	[1] 10		20,000	Wind	Damage to buildings, utility lines, and trees.
Rooks County, Kans., southern portion.	21	10 p. m.-midnight	[1] 3		30,000	Heavy hail	Loss in crops severe in parts of the path which was 8 miles long.
Volusia County, Fla.	22	4:10-4:45 p. m.			125,000	Hail	Loss in citrus and victory gardens.
Groveland, Fla.	22				10,000	do	Loss in watermelon crop.
Pontotoc County, Okla.	23	3:30 a. m.	[1] 3		38,250	Hail and wind	Property damage, $10,000; loss in crops, $28,250; path 14 miles long.
Roanoke County, Va., southwest portion.	23	2 p. m.	[1] 3		75,000	Hail	Loss in fruit.
Rockingham County, Va.	23	do	[1] 1		6,000	do	Loss in grain, hay, and gardens.
Eagle Pass, Tex.	24	5:15 p. m.			5,000	Wind	Utility property damaged.
Hughes County, S. Dak.	24	p. m.				Wind and rain	Strong wind damaged a smokestack in Blunt, S. Dak., and blew over several windmills, small buildings, and damaged roofs in the vicinity of Canning.
Pipestone, Minn., vicinity of	25	12 a. m., C. W. T.			3,000	Thundersquall	A sheep shed demolished, a corn crib overturned, and a number of trees uprooted.
Tulsa County, Okla.	25	1:45 p. m.	[1] 5		40,000	Wind and hail	Property damaged, $5,000; loss in crops, $35,000; path 10 miles long.
Fergus Falls, Minn., and vicinity.	25	3:15 p. m., C. W. T.			25,000	Tornadic wind, heavy rain, and light hail.	2 large cylindrical grain tanks blown over and a large metal grain tank moved and twisted. Many trees uprooted and branches broken; barns and smaller buildings on several farms demolished or damaged, and some poultry killed. Rain and hail caused some damage to growing crops and gardens.
Pottawatomie County, Okla.	26	8 p. m.	150	0	26,000	Tornado	Property damage, $1,000; loss in crops, $25,000; 2 persons injured.
Botetourt County, Va.	28	4:30 p. m.	[1] 3		3,000	Hail	Loss in apple crop.
Gainesville, Fla., and vicinity.	29				1,500	Wind	Loss in crops, $1,000; property damaged, $500.
Dodge County, Wis., northwestern portion.	30	7-9 p. m., C. S. T.			6,000	Thunderstorm	Considerable damage by lightning and minor damage from wind. 2 barns, a granary and contents and 20 hogs destroyed by fire; 13 cattle electrocuted and utility lines disrupted.
Marionette County, Wis.	30	10 p. m.			5,000	Electrical	Barn with hay, grain, coal, and 150 chickens burned; silo and few trees down and utility service disrupted.
Minneapolis, Minn., and vicinity.	30	p. m.			6,700	do	A cottage on Big Island, Lake Minnetonka, destroyed, and 3 street cars struck by lightning and damaged.
Lincoln County, Mont.	30					Heavy hail	Storm over grazing area.
Appleton, Wis., and vicinity.	31	3:45 p. m., C. S. T.			10,000	Thunderstorm	2.31 inches of rain, falling in a short time, recorded during this storm. Trees blown down breaking utility lines; many basements flooded.
Groom, Tex.	31	p. m.	[1] 5		550,000	Hail	Loss in wheat and row crops; some additional damage to roofs and buildings.

[1] Miles instead of yards.

SOLAR RADIATION AND SUNSPOT DATA FOR MAY 1944

[Solar Radiation Investigations Section, I. F. Hand in charge]

SOLAR RADIATION OBSERVATIONS FOR MAY 1944

EXPLANATIONS of the tables and references to descriptions of instruments, stations, and methods of observation, and to summaries of data, and also a list of pyrheliometric stations are given in the REVIEW for January 1944, page 43.

Publication of normal-incidence values for Blue Hill from December 1943 to May 1944, inclusive, held up pending a thorough restandardization of the Eppley normal-incidence pyrheliometer, follows:

LATE DATA FOR BLUE HILL, MASS.

TABLE 1.—*Solar radiation intensities during the period December 1943–April 1944, inclusive*

[Gram-calories per minute per square centimeter of normal surface]

BLUE HILL, MASS.

Date	7:30 a. m.	Sun's zenith distance 78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass A. M.					P. M.				Local mean solar time
	e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e
1943	mb.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.
Dec. 1	3.5	0.76	0.93								3.6
Dec. 5	4.8	.88	.99	1.19	1.36			1.13	1.05	0.98	4.4
Dec. 8	3.6	.88	.97	1.08							4.4
Dec. 11	.9						1.41	1.23	1.10	1.02	.8
Dec. 13	2.0			1.25	1.38			1.29	1.16	1.02	1.1
Dec. 15	1.2	1.02	1.11	1.19					1.04	.98	.9
Dec. 16	1.0							1.20	1.11	1.00	1.7
Dec. 17	1.3	.93	1.00	1.09					.86	.72	3.0
Dec. 18	2.5	.69	.80	.95				.86			3.8
Dec. 19	3.5	.42	.57	.69				.74	.57		4.0
Dec. 23	1.1	.69	.82	.94					.93	.85	.8
Dec. 24	.6	1.00	1.09	1.25			1.36	1.17	1.07	.97	1.1
Dec. 28	3.5	.91	.96				1.36	1.22	1.12	1.03	1.2
Dec. 29	.7	1.07	1.15	1.28	1.48			1.30	1.16	1.06	.8
Dec. 30	.8									.78	1.2
Dec. 31	3.6							1.10	.97	.82	2.5
Means		**.84**	**.94**	**1.09**	**1.41**		**1.38**	**1.12**	**1.01**	**.94**	
Departures		**−.06**	**−.10**	**−.08**	**+.07**		**+.08**	**−.02**	**−.03**	**−.03**	
1944											
Jan. 1	3.8	.51	.60	.71				1.26	1.12	1.02	2.1
Jan. 2	1.3	.91	1.02	1.12							2.5
Jan. 7	4.0							1.21	1.07	.92	2.9
Jan. 8	1.7	.88	.99	1.11							1.9
Jan. 9	1.1	.99	1.06	1.11				1.17	1.04	.92	1.5
Jan. 10	2.6								.99	.92	3.0
Jan. 11	3.0	.88	.98	1.06							3.8
Jan. 12	4.0							1.18	1.07	.94	2.1
Jan. 13	1.8	.98	1.08	1.22			1.37	1.25	1.13	1.05	2.2
Jan. 16	1.9							1.14	1.03	.91	1.3
Jan. 17	.8	1.12	1.18	1.26							3.6
Jan. 18	4.0	.61	.73	.93				.54	.42	.31	4.0
Jan. 20	6.0							.35	.24	.21	5.6
Jan. 21	5.1	.45		.79							5.3
Jan. 22	4.6	.75	.93	1.08							4.0
Jan. 24	4.2						1.38	1.28	1.17	1.07	3.6
Jan. 28	4.0	1.06									4.2
Jan. 30	1.8	1.05						1.30	1.16	1.07	1.3
Jan. 31	1.3	1.10	1.20	1.33	1.41						1.6
Means		**.87**	**.98**	**1.07**	**(1.41)**		**(1.38)**	**1.07**	**.95**	**.85**	
Departures		**−.07**	**−.05**	**−.08**	**+.09**		**+.05**	**−.09**	**−.08**	**−.07**	
Feb. 1	3.6							1.09	1.09	1.06	1.7
Feb. 2	.9	1.00	1.17	1.28					1.10	.99	1.7
Feb. 3	2.7	.93	1.04						1.15	1.01	3.2
Feb. 4	1.9	1.03	1.24								2.2
Feb. 8	1.0	1.06	1.18	1.31	1.45		1.44	1.27	1.12	1.04	.9
Feb. 9	.8			1.21							1.9
Feb. 10	2.6						1.33	1.14			1.4
Feb. 13	1.3	.95	1.01	1.16	1.40		1.42	1.27	1.16	1.07	1.5
Feb. 18	6.4								.95		4.4
Feb. 19	.7	1.11	1.20	1.32	1.46		1.44	1.26	1.10	.99	.9
Feb. 20	1.3						1.11	.81	.71		2.2
Feb. 21	2.9	.65	.78	1.00			1.26	1.12		.87	3.3
Feb. 24	4.8	.67	.81	.89	.97			.69	.50	.36	6.6
Feb. 25	2.7	1.01	1.10	1.22	1.37		1.36	1.21	1.06	.96	2.7
Feb. 26	2.4	.94	1.05	1.14							2.9
Means		**.94**	**1.06**	**1.05**	**1.33**		**1.34**	**1.10**	**.99**	**.93**	
Departures		**+.01**	**+.01**	**−.06**	**+.03**		**+.05**	**−.05**	**−.03**	**+.01**	
Mar. 1	2.7		.78	.99	1.27		1.35	1.24	1.13	1.02	2.5
Mar. 2	.7	1.04	1.13	1.26	1.43		1.37	1.15	1.03	.93	.7
Mar. 5	.7							1.31	1.20	1.12	1.1
Mar. 6	.8	1.13	1.22	1.29	1.46						.8
Mar. 8	3.6	.73	.82	1.01	1.15						3.6
Mar. 9	1.9	.78	.88	1.00	1.21						2.1

*Extrapolated.

TABLE 1.—*Solar radiation intensities during the period December 1943–April 1944, inclusive*—Continued

BLUE HILL, MASS.—Continued

Date	7:30 a. m.	Sun's zenith distance 78.7°	75.7°	70.7°	60.0°	0.0°	60.0°	70.7°	75.7°	78.7°	1:30 p. m.
	75th mer. time	Air mass A. M.					P. M.				Local mean solar time
	e	5.0	4.0	3.0	2.0	*1.0	2.0	3.0	4.0	5.0	e
	mb.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	cal.	mb.
Mar. 10	1.9	.91	1.02	1.22	1.34						2.0
Mar. 11	2.0	.91	1.02	1.15	1.33						2.0
Mar. 12	4.8	.62	.70	.87	1.08						5.3
Mar. 14	2.6	.92	1.02	1.16	1.31		1.22		.88	.81	3.3
Mar. 21	2.6								1.01	.87	3.5
Mar. 22	2.0	.91	1.01	1.12							3.2
Mar. 24	6.4						1.18	1.03	.92	.80	4.6
Mar. 25	4.6	.92	1.04	1.16	1.32					.60	4.8
Mar. 26	8.1						1.37	1.19	1.09	.96	3.3
Mar. 31	5.8		.67	.75						.56	3.5
Means		**.89**	**.94**	**1.08**	**1.29**		**1.30**	**1.18**	**1.04**	**.85**	
Departures		**.00**	**−.04**	**−.02**	**+.04**		**+.06**	**+.10**	**+.07**	**−.01**	
Apr. 1	3.6	.83	.96	1.10	1.26						3.3
Apr. 3	3.0						1.27	1.02	.88		2.5
Apr. 4	3.3	.75	.88	1.03							2.7
Apr. 6	3.8			.80			1.26				2.9
Apr. 7	5.1						1.20				3.6
Apr. 11	4.6	.89	.99	1.09							4.8
Apr. 13	4.6			1.16				1.16			2.7
Apr. 14	2.7	.99	1.08	1.18	1.33	1.52	1.23	1.02	.89	.78	2.4
Apr. 18	5.6	.91	1.00	1.12	1.26						3.6
Apr. 19	4.4	.77	.91	1.05	1.22	1.46	1.03	.87	.75	.63	3.6
Apr. 20	4.8	.75	.87	.92	1.18	1.41	1.10				4.8
Apr. 22	6.6				1.16						4.4
Apr. 28	4.4				1.17		1.16	1.01	.88	.82	4.6
Apr. 29	4.2	.72	.82	.85	1.05			.91	.78	.68	4.6
Means		**.83**	**.94**	**1.03**	**1.20**	**1.46**	**1.18**	**1.00**	**.84**	**.73**	
Departures		**+.04**	**+.05**	**.00**	**+.02**	**+.08**	**+.06**	**+.05**	**+.03**	**+.06**	

MADISON, WIS.

May 5	5.6	0.49	0.52	0.76	1.02	1.18					5.6
May 29	13.7		.34	.42	.60	.94					15.3
Means		**(.49)**	**(.43)**	**(.59)**	**(.81)**	**(1.06)**					
Departures		**−.12**	**−.34**	**−.37**	**−.30**	**−.31**					

LINCOLN, NEBR.

May 13	16.4					1.38	1.17	0.99	0.86		14.2
May 21	15.8					1.31	1.08	.86	.75	0.69	18.3
Means						**(1.34)**	**(1.12)**	**(.92)**	**(.80)**	**(.69)**	
Departures						**−.04**	**−.01**	**+.01**	**.00**	**+.02**	

BLUE HILL, MASS.

May 3	10.2			0.53	0.70		0.77	0.57	0.43		13.7
May 4	13.2	0.41	0.52	.67	.90		.75	.59	.48	0.38	12.7
May 5	14.2	.36	.50	.65	.89						14.7
May 8	9.1						.90	.72	.62	.54	8.1
May 9	9.1	.52	.61	.72	.93						8.1
May 10	9.4	.39	.46		.84						7.5
May 12	11.8					1.40					7.5
May 13	14.7				.78						15.3
May 14	13.7			.73	.91						8.4
May 15	7.8	.76	.85	.94	1.08						9.4
May 17	13.2				1.00						11.8
May 19	3.5						1.09	.89	.75		3.8
May 20	6.9		.72	.90		1.40					4.0
May 21	6.1	.72	.80	.96	1.15	1.37					4.8
May 27	17.6						.66				22.6
May 29	11.0	.63	.72	.84	1.09	1.40					7.8
Means		**.54**	**.65**	**.77**	**.93**	**1.39**	**.83**	**.69**	**.57**	**(.46)**	
Departures		**−.09**	**−.13**	**−.18**	**−.16**	**+.03**	**−.23**	**−.18**	**−.15**	**−.17**	

ALBUQUERQUE, N. MEX.

May 4	5.3				1.28		1.19				4.8
May 5	4.0				1.29						4.4
May 6	5.1				1.27						5.3
May 9	8.0				1.20						7.7
May 11	9.0				1.28						9.0
May 12	8.7				1.29	1.46	1.23				6.6
May 13	11.3				1.16						10.1
May 18	6.3				1.09	1.51					5.8
May 19	4.6				1.07	1.48					5.6
May 20	5.1				1.15	1.50					6.1
May 22	7.4				1.13	1.47					4.6
May 23	6.1				1.17	1.47	1.20				4.6
May 24	5.3						1.21				4.8
May 25	7.7				1.15						8.0
May 28	11.3	0.87	0.94	1.05	1.19	1.47	1.14		0.88	0.80	13.6
May 29	12.2					1.44					14.1
May 30	14.6				1.10	1.42	1.21	1.05	.91	.82	13.6
May 31	9.7	.86	.95	1.08	1.05	1.46	1.25	1.06			4.4
Means		**(.86)**	**(.94)**	**(1.06)**	**1.18**	**1.47**	**1.20**	**(1.06)**	**(.90)**	**(.81)**	
Departures		**−.01**	**−.02**	**−.03**	**−.04**	**−.05**	**−.03**	**−.04**	**−.07**	**−.08**	

*Extrapolated.

TABLE 2.—*Daily totals and weekly means of solar radiation (direct+diffuse) received on a horizontal surface*

[Gram-calories per square centimeter]

Date	Washington, D. C.	Madison, Wis.	Lincoln, Nebr.	East Lansing, Mich.	New York, N. Y.	Fresno, Calif.	Fairbanks, Alaska	Columbia, Mo.	Boston, Mass.	Nashville, Tenn.	Twin Falls, Idaho	La Jolla, Calif.	Blue Hill, Mass.	Ithaca, N. Y.	Newport, R. I.	State College, Pa.	Put-in-Bay, Ohio	East Wareham, Mass.	Davis, Calif.
1944	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*	*cal.*
Apr. 29	682	597	21	612	650	590	528	590	572	635	586	649	676	692	675	697	684	624	463
Apr. 30	665	184	284	456	607	676	609	457	468	297	612	376	532	636	534	637	566	546	655
May 1	517	468	480	171	552	656	500	446	512	323	607	386	592	536	580	520	322	549	713
May 2	389	136	107	325	239	661	291	304	376	557	666	180	433	319	480	373	480	553	733
May 3	618	340	51	354	464	661	413	412	499	479	667	529	602	581	574	590	555	586	748
May 4	597	220	298	288	528	675	516	392	527	74	667	580	615	493	649	527	221	610	709
May 5	616	485	80	59	572	659	485	257	504	439	672	684	590	601	641	560	69	604	702
Mean	**584**	**347**	**189**	**324**	**516**	**654**	**477**	**410**	**494**	**400**	**640**	**484**	**577**	**551**	**590**	**558**	**414**	**582**	**675**
Departure	**+105**	**−94**	**−260**	**−14**	**+59**	**+35**	**+53**	......	......	**−68**	**+111**	**−80**	**+99**	**+125**	**+90**	**+84**	**+17**	**+99**	**+36**
May 6	273	398	467	511	524	385	487	258	384	293	622	593	558	339	646	139	598	610	653
May 7	488	461	2	250	92	671	248	272	280	590	557	571	326	80	386	224	485	532	713
May 8	619	87	193	68	655	680	570	168	594	532	519	637	673	641	681	608	269	660	742
May 9	523	220	571	81	504	671	306	528	547	325	153	491	625	193	620	352	82	613	720
May 10	557	596	449	592	500	670	408	456	515	626	154	312	601	276	647	424	655	616	771
May 11	561	510	394	510	404	712	225	557	519	639	......	637	577	......	537	472	612	548	749
May 12	525	497	651	446	367	697	235	590	564	385	......	662	623	......	494	627	496	560	736
Mean	**507**	**395**	**389**	**353**	**435**	**641**	**354**	**404**	**486**	**484**	**401**	**558**	**569**	**306**	**573**	**407**	**457**	**592**	**726**
Departure	**+41**	**−55**	**−61**	**+16**	**−7**	**+3**	**−94**	......	......	**−6**	**−169**	**−27**	**+90**	**−139**	**+88**	**−47**	**+63**	**+97**	**+25**
May 13	526	451	694	282	402	713	297	586	457	612	......	554	573	......	548	460	610	612	820
May 14	667	627	543	638	699	676	491	683	546	626	......	673	619	......	658	705	708	615	324
May 15	623	520	545	534	526	465	358	605	484	630	......	501	602	......	658	493	596	641	638
May 16	594	517	600	292	307	640	526	603	462	658	......	638	496	165	448	383	332	424	642
May 17	540	314	622	262	497	347	556	748	551	630	......	574	638	560	674	534	408	655	366
May 18	388	289	624	321	553	578	480	631	668	532	......	550	721	698	604	613	590	614	676
May 19	202	571	641	204	601	682	335	687	711	564	......	584	775	718	749	595	432	724	718
Mean	**506**	**470**	**610**	**362**	**512**	**586**	**435**	**649**	**554**	**607**	......	**582**	**632**	**535**	**620**	**541**	**525**	**612**	**598**
Departure	**+31**	**0**	**+100**	**+22**	**+46**	**−62**	**−10**	......	......	**+108**	......	**+20**	**+120**	**+62**	**+86**	**+97**	**+109**	**+118**	**−109**
May 20	486	658	181	377	573	712	459	429	721	631	......	298	754	698	726	411	497	683	773
May 21	349	128	656	246	612	690	321	433	728	506	......	268	748	......	738	300	394	666	755
May 22	540	455	628	158	362	729	506	561	104	606	......	200	162	93	322	369	512	206	775
May 23	422	415	586	279	119	734	370	243	191	396	......	346	142	179	306	281	420	218	779
May 24	190	200	597	394	72	732	295	365	394	631	......	604	405	129	110	189	540	306	790
May 25	115	507	379	406	88	711	233	659	530	522	......	425	402	453	530	369	612	502	770
May 26	270	519	464	554	179	700	251	571	608	679	......	401	675	526	695	484	649	705	737
Mean	**339**	**412**	**499**	**345**	**287**	**715**	**348**	**466**	**468**	**567**	......	**363**	**470**	**346**	**490**	**343**	**518**	**469**	**768**
Departure	**−154**	**−80**	**−43**	**−21**	**−176**	**+49**	**−106**	......	......	**+56**	......	**−133**	**+16**	**−137**	**+56**	**−96**	**+51**	**−23**	**+82**
May 27	403	614	348	587	361	607	661	......	624	389	......	454	602	618	513	450	575	556	552
May 28	550	697	540	643	667	682	558	......	637	478	......	392	650	704	662	672	752	626	651
May 29	659	635	571	638	634	551	661	......	647	668	......	447	714	629	683	689	697	737	763
May 30	608	578	482	547	497	737	531	......	617	454	......	508	644	581	655	670	680	664	694
May 30	628	543	597	310	505	511	588	......	616	414	......	348	618	628	573	606	570	606	165
June 1	441	455	720	376	281	629	363	......	322	629	......	421	332	384	359	373	440	363	660
June 2	582	687	648	529	318	638	705	......	606	450	......	494	618	612	518	445	448	499	505
Mean	**553**	**601**	**558**	**579**	**466**	**622**	**581**	......	**581**	**497**	......	**438**	**597**	**594**	**566**	**558**	**595**	**578**	**570**
Departure	**+44**	**+109**	**+32**	**+104**	**−35**	**−52**	**+92**	......	......	**−36**	......	**−109**	**+53**	**+92**	**−6**	**+104**	**+81**	**+46**	**−92**

ACCUMULATED DEPARTURES ON JUNE 2, 1944

	−2,485	−3,612	−8,701	−4,963	−4,851	+2,149	......	......	......	−427	......	−2,338	+2,317	......	−406	+308	−14	+2,282	+679

POSITIONS, AREAS, AND COUNTS OF SUNSPOTS FOR MAY 1944

By LUCY T. DAY

[Equatorial Division, U. S. Naval Observatory]

[Communicated by Capt. J. F. Hellweg, U. S. N. (Ret.) Superintendent, U. S. Naval Observatory. All measurements and spot counts were made at the Naval Observatory from plates taken at the observatories indicated. Difference in longitude is measured from the central meridian, positive toward the west. Latitude is positive toward the north. Areas are corrected for foreshortening and expressed in millionths of Sun's hemisphere. For each day, under longitude, latitute, area of spot or group, and spot count are included assumed longitude of center of the disk, assumed latitude of center of the disk, total area of spots and groups and total spot count.]

Date	Eastern standard time	Mount Wilson group No.	Heliographic: Difference in longitude	Heliographic: Longitude	Heliographic: Latitude	Heliographic: Distance from center of disk	Area of spot or group	Spot count	Plate quality	Observatory
1944	h m		°	°	°	°				
May 1	10 40			No spots					VG	U. S. Naval
2	10 20			No spots					G	Do.
3	10 59			No spots					G	Do.
4	10 53			No spots					F	Do.
5	10 59			No spots					G	Do.
6	11 2			No spots					P	Do.
7	11 11			No spots					F	Do.
8	11 1			No spots					G	Do.
9	10 41			No spots					F	Do.
10	11 11			No spots					F	Do.
11	10 57			No spots					G	Do.
12	10 45			No spots					G	Do.
13	11 6			No spots					G	Do.
14	10 33			No spots					G	U. S. Naval.
15	10 48			No spots					G	Do.
16	11 31			No spots					F	Do.
May 17	10 40			No spots					F	Do.
18	11 12			No spots					G	Do.
†19	12 22			No spots						Mt. Wilson.
†20	10 35			No spots						Do.
†21	11 20			No spots						Do.
†22	11 0			No spots						Do.
23	11 11			No spots					F	U. S. Naval.
†24	13 30			No spots						Mt. Wilson.
†25	12 30			No spots						Do.
†26	12 44			No spots						Do.
†27	12 36			No spots						Do.
28	10 38	7641	−12	163	−22	22	48	7	G	U. S. Naval.
				(175)	(−1)		48	7		
29	10 41	7641	+2	164	−22	21	36	5	G	Do.
				(162)	(1)		36	5		
30	10 51	7641	+17	166	−22	27	6	2	G	Do.
		7642	+48	197	+1	48	48	12		
				(149)	(−1)		54	14		
31	11 6	7642	+62	198	+2	62	61	3	G	Do.
		7642	+66	202	+1	66	109	4		
				(136)	(−1)		170	7		

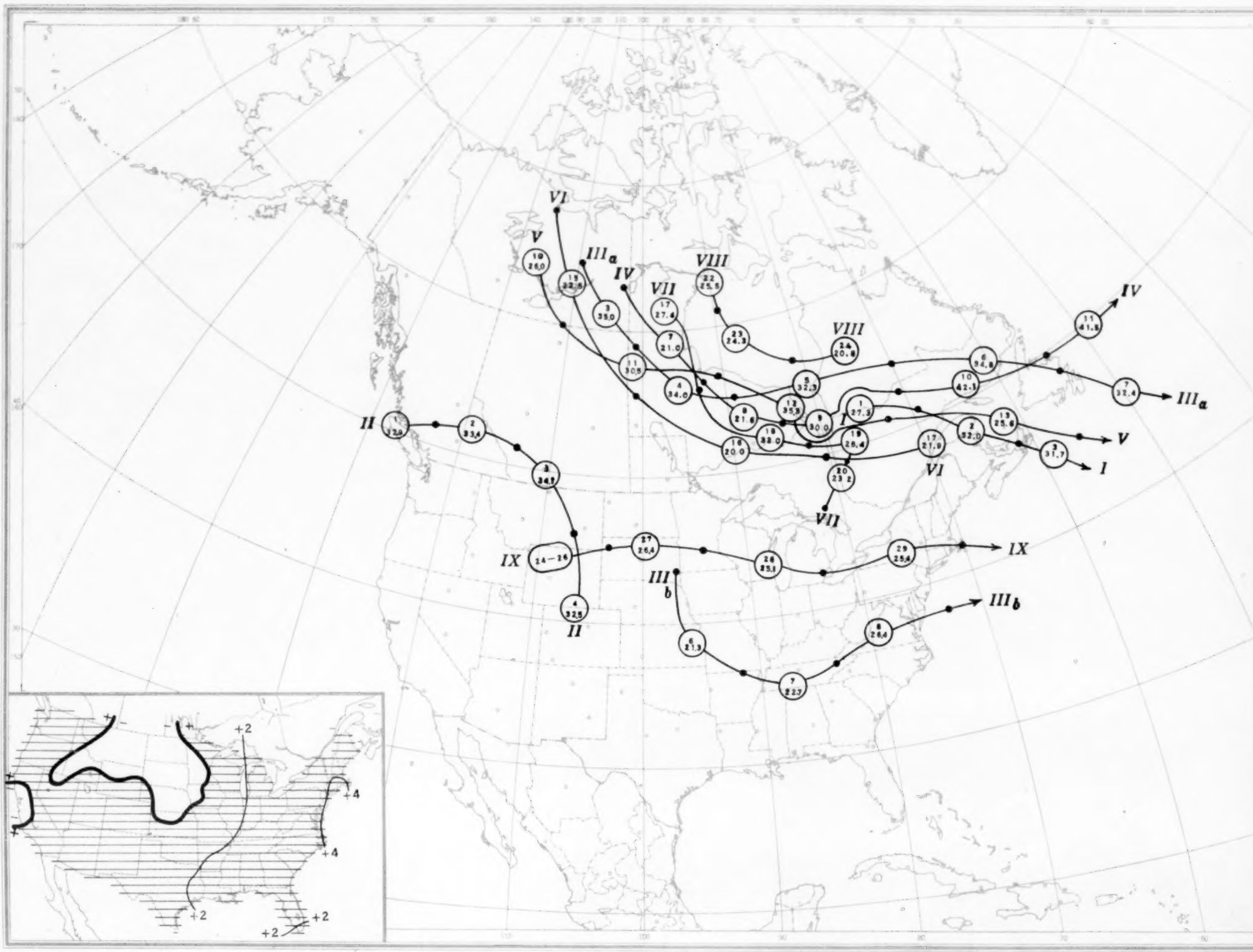
Mean daily area for 31 days = 10

†Data taken from Mount Wilson charts.
VG=very good; G=good; F=fair; P=poor.

Chart I. Departure (°F.) of the Mean Temperature from the Normal, and Wind Roses for Selected Stations, May 1944

Chart II. Tracks of Centers of Anticyclones, May 1944. (Inset) Departure of Monthly Mean Pressure from Normal

(Plotted by A. Bloom)

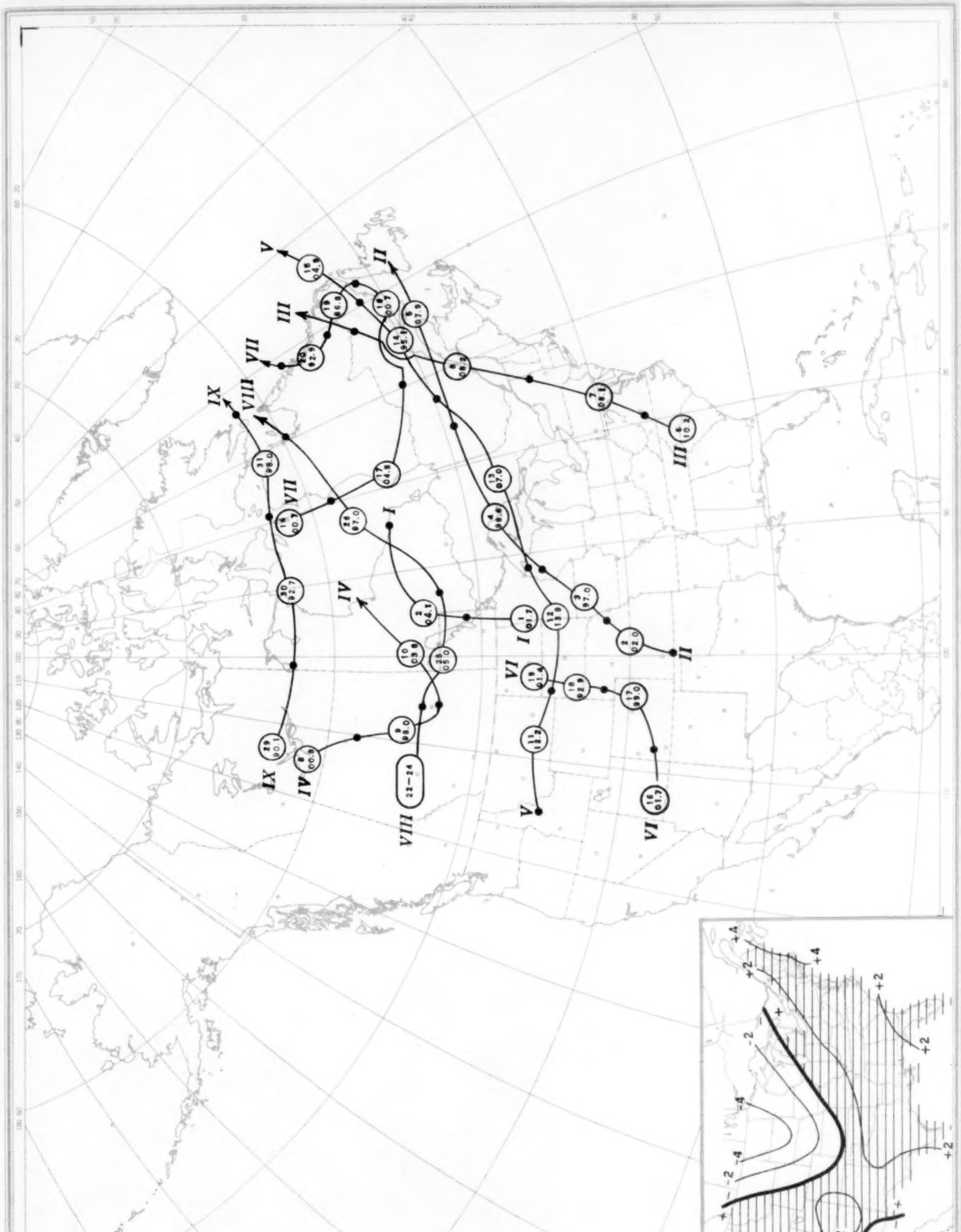


Circle indicates position of anticyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of anticyclone at 7:30 p. m. (75th meridian time)

Chart III. Tracks of Centers of Cyclones, May 1944. (Inset) Change in Mean Pressure from Preceding Month

Chart III. Tracks of Centers of Cyclones, May 1944. (Inset) Change in Mean Pressure from Preceding Month

(Plotted by A. Bloom)



Circle indicates position of cyclone at 7:30 a. m. (75th meridian time), with barometric reading. Dot indicates position of cyclone at 7:30 p. m. (75th meridian time).

Chart IV. Percentage of Clear Sky Between Sunrise and Sunset, May 1944

Chart V. Total Precipitation, Inches, May 1944. (Inset) Departure of Precipitation from Normal

Chart V. Total Precipitation, Inches, May 1944. (Inset) Departure of Precipitation from Normal

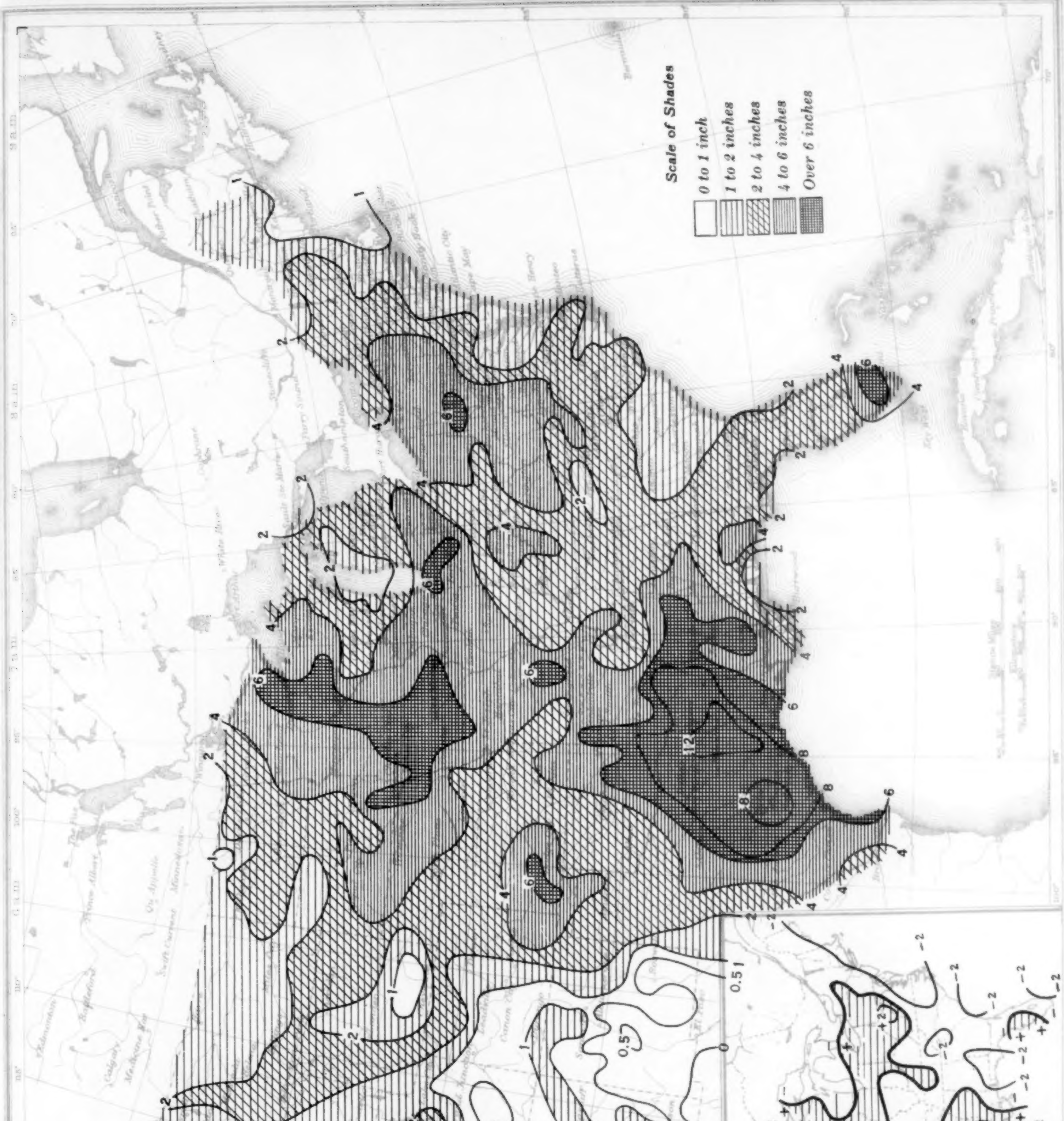


Chart VI. Isobars at Sea Level and Isotherms at Surface; Prevailing Winds, May 1944

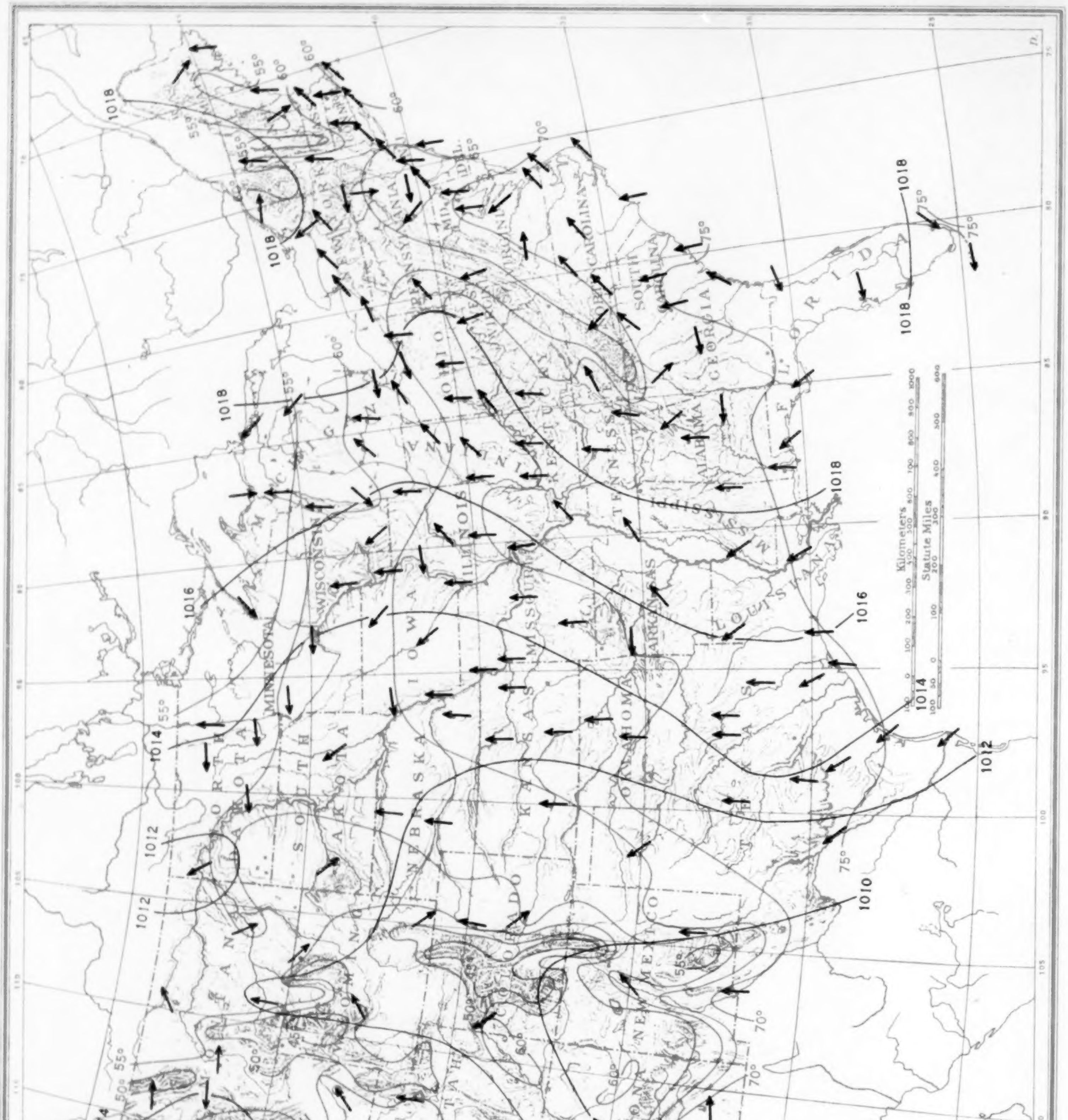


Chart VIII. Isobars (mb) for 1,524 Meters (5,000 ft.), and Isotherms (°C.), and Resultant Winds for 1,500 Meters (m. s. l.) May 1944

Chart VIII. Isobars (mb) for 1,524 Meters (5,000 ft.), and Isotherms (°C.), and Resultant Winds for 1,500 Meters (m. s. l.) May 1944

Isobars and Isotherms based on radiosonde observations at 11:00 p. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 a. m. (E. S. T.).

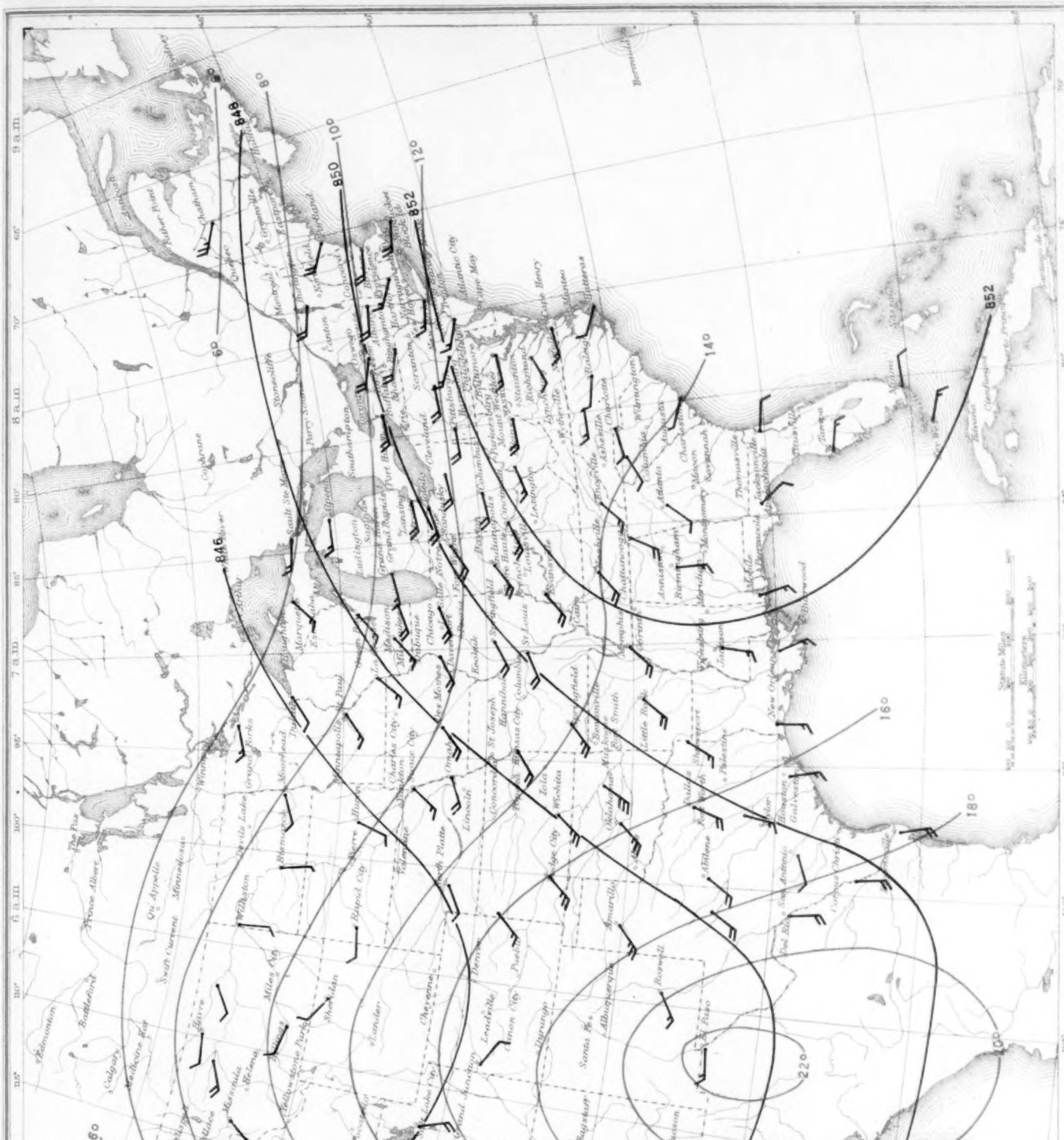


Chart IX. Isobars (mb), Isotherms (°C.), and Resultant Winds for 3,000 Meters (m. s. l.) May 1944

Isobars and Isotherms based on radiosonde observations at 11:00 p. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 a. m. (E. S. T.).

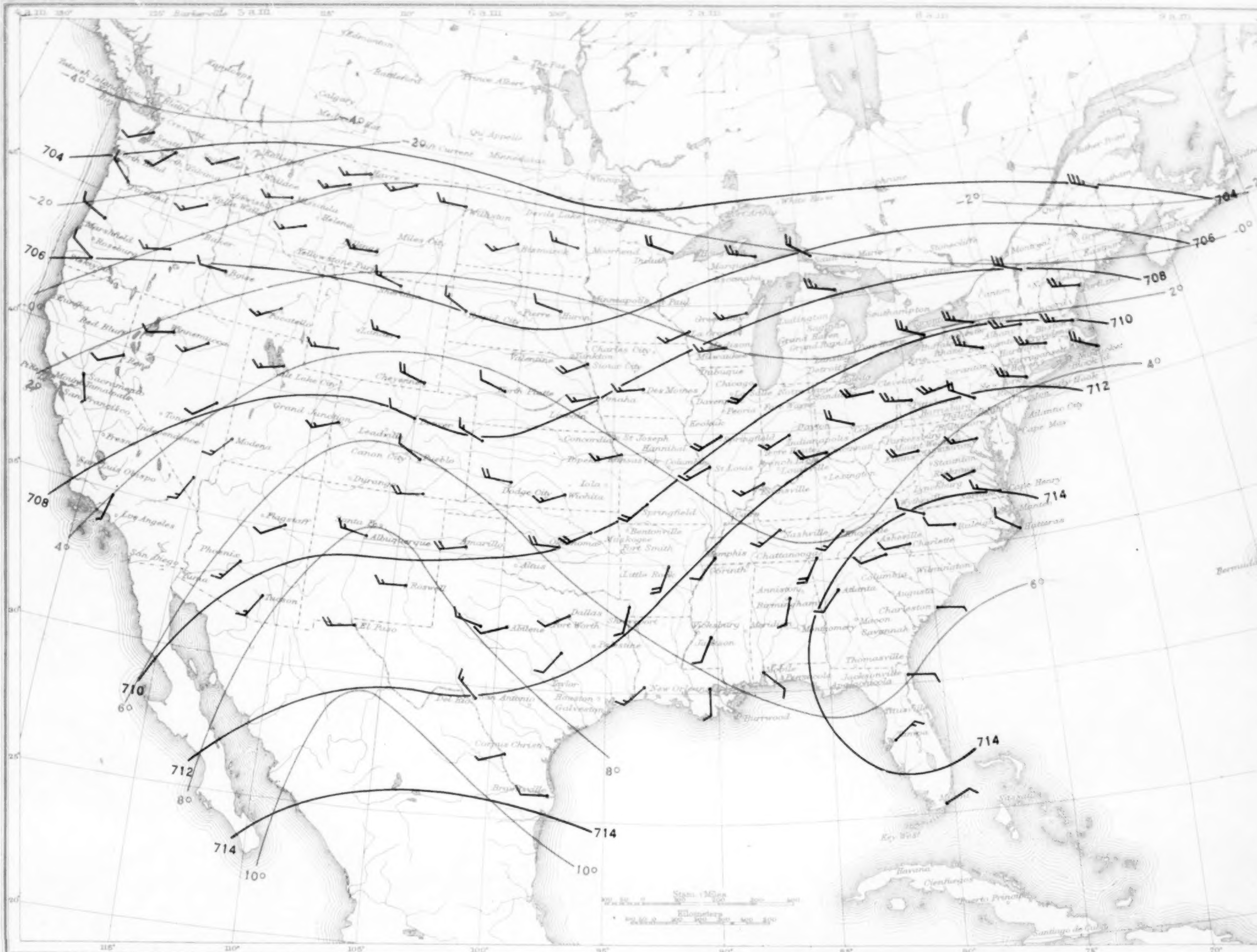


Chart X. Isobars (mb), Isotherms (°C.), and Resultant Winds for 5,000 Meters (m. s. l.) May 1944

Chart X. Isobars (mb), Isotherms (°C.), and Resultant Winds for 5,000 Meters (m. s. l.) May 1944

Isobars and Isotherms based on radiosonde observations at 11:00 p. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 p. m. (E. S. T.)

Chart XI. Isobars (mb), Isotherms (°C.), and Resultant Winds for 10,000 Meters (m. s. l.) May 1944

Isobars and Isotherms based on radiosonde observations at 11:00 p. m. (E. S. T.) and winds based on pilot-balloon observations at 5:00 p. m. (E. S. T.).